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WILDLIFE IN NORTH CAROLINA

NORTH CAROLINA Wildlife RESOURCES COMMISSION

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Whale sharks are the world's largest species of fish and occasional visitors to our state's waters. A whale shark also provided a local scientist with the discovery of a lifetime nearly 100 years ago. **PHOTOGRAPH BY TODD PUSSER.**

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WILDLIFE IN NORTH CAROLINA

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Cover: An Eastern wild turkey struts in a field hoping to attract a willing hen to mate. See page 10 to read about new-and-improved decoys available to hunters. PHOTOGRAPH BY RALPH HENSLEY.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

EDITOR'S NOTE

A little bit of creativity can go a long way, even when trying to save a rare fish. That was the case in the early stages of efforts to save the sicklefin redhorse, a medium-sized suckerfish found exclusively in six Appalachian counties in western North Carolina and Georgia. A little more than 10 years ago, a small group of biologists were conducting data collection on the sicklefin redhorse along the Little Tennessee River when they discovered some that were ready for spawning.

NCWRC

The biologists jumped at the opportunity to breed some in captivity but were without anything to collect the milt and eggs. So they searched shoreline and found an old mustard jar that served as the first transport of a unique effort to save the species.

"It was serendipity," Wildlife Resources Commission biologist Steve Fraley said. "That was the beginning of something that we ended up working on together and that ended up being the centerpiece of our efforts to expand the population and ultimately keep it off the endangered species list."

Since then, thousands of sicklefin redhorse have been bred in captivity and released back to western North Carolina and Georgia streams. That number should increase after a group of state and federal agencies (including the WRC), power companies and the Eastern Band of Cherokee Indians signed a Candidate Conservation Agreement in February to expand conservation efforts. The agreement includes provisions for the partners to collect and fertilize sicklefin redhorse eggs from the Little Tennessee, Oconaluftee, Tuckasegee, and Hiwassee rivers and hatching the young in captivity; stocking North Carolina and Georgia streams native to the fish and exploring others blocked by dams; and managing water levels and habitat.

Though the sicklefin redhorse was only recently discovered to be a unique species, the Cherokees have known about it for generations. It had been a staple of their diet, and the Cherokees long ago named it jungihtla, which translates to "wearing a red feather."

"It's pretty neat. A lot of people will travel around to exotic places in the world to study and understand rare species. But we have one found only in western North Carolina, right in our backyard." said Mike LaVoie, a biologist with the Eastern Band of Cherokee Indians.

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Thanks for the Memories

As a widow I can assure you that losing a spouse leaves a void in your life that is not easily overcome. And although John is no longer with us physically, memories of our life together will forever be my most prized possessions. After reading your article in the 2016 Spring Fishing and Boating Guide ("The Fishing Facility" by Mike Zlotnicki), I felt compelled to send you a note, not of sadness and regret, but instead of pride, respect and sincere gratitude to you.

Thank you for honoring John and me with your wonderfully written article. It makes my heart smile to think of the fun and excitement that takes place at The John E. Pechmann Fishing Education Center. I am confident that John looks upon it with a sense of pride, as it represents all that he was: a loving husband and passionate sportsman whose dedication to the betterment of others never ceased.

I truly appreciate you helping to keep John's memory alive through communicating all the wonderful activities available at the Center. If John were alive today, he would have been hard-pressed to explain the Center's value with the ease that you did. Again, thanks so much.

Amy Pechmann
Fayetteville

Keep Turkey Talks Coming

I want to share my thoughts on the turkey hunting seminar I attended at N.C. State in March.

First, I'd like to say that it was very well organized. The instructors were experienced and knowledgeable turkey hunters. While I'm not exactly a newbie to the sport, I never pass up an opportunity to hear people talk turkey. You can never learn too much, and listening to a biologist discuss feeding habits and mating cycles of wild turkeys helps one remember that there's much more to hunting these wise birds than just good camo and a seductive yelp on box call.

The majority of people in the audience were definitely there to learn. They were mostly riveted to every word and slide, and diligently taking notes. The end of the two-and-a-half hour seminar featured a Q&A session, with many participants asking very good questions.

I'm looking forward to when NCWRC schedules another turkey hunting seminar. I'll be there, along with my hunting partners. Like I said, you can never talk too much turkey to a turkey hunter. My only request is that the next venue be more easily accessible than the auditorium on the N.C. State campus. Navigating and parking was a bit of a nightmare due to the congestion of all the students.

Thanks for all the work that you do!

Ken Mummert
Wake Forest

Let's Support Hunter Education

It's just a shame that some schools turn a deaf ear to Hunter Education programs because they include guns. This program teaches excellent hand/eye coordination, marksmanship and sportsmanship. These kids learn the proper handling of firearms and archery equipment as well as compass and bookwork.

My son, along with his team from his junior high school, have gone to both the district and state tournaments the past two years, bringing home several awards (sportsmanship being one of them). Individuals and their teams and coaches are very dedicated to their events and are recognized for their hard work by our N.C. Wildlife Commission, and now the National Guard is getting involved in some areas. I'm glad to say that my son is a part of one of the most well-mannered groups in our school system's sporting events! Yes, this is a true sporting event.

Sandy Latham Leroy
Advance

A Fish Worth Saving

I am a graduate student at N.C. State University, and my thesis research is focused on the sicklefin redhorse and other fishes that live in the Hiwassee River and its tributaries. I am excited about the recent Candidate Conservation Agreement, which establishes a formal arrangement between state and federal agencies, the Cherokee tribe, and utility companies to conserve the sicklefin redhorse and its habitat.

The sicklefin redhorse only occurs in two river systems — the Hiwassee (including Valley River, Brasstown Creek, Hanging Dog Creek and Nottely River) and the Little Tennessee (including the Oconoluftee and Tuckasegee rivers). Its historic range has been reduced by an estimated 60 percent due to damming activities during the mid-1900s and ongoing habitat degradation. So even within these river systems, it is not widespread. It is similar in appearance and behavior to other suckers that live throughout the state but fulfills a slightly different ecological role. Like all suckers, it is important for maintaining a clean stream bottom and healthy ecosystem. And like all suckers, if it is caught, it should be released.

With flashy golden scales and fire-engine red fins, including its namesake crescent-shaped dorsal fin, the sicklefin redhorse is beautiful! It migrates upstream in large numbers, and reproduces while splashing in the shallows, which makes for quite the show during the spring spawning season. I hope that this species is conserved and rehabilitated for generations to come!

Tomas Ivasauskas
Raleigh

write us

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Ecological Engineers

Few creatures can transform a habitat quite like cavity-building woodpeckers.

Written by
Jared Lloyd

TODD PUSSER

A red-bellied woodpecker and a red-headed woodpecker are part of the "ecological engineers" avian division. Top: A female pileated woodpecker feeds her young nesting in a cavity in a rotten pine snag.

THE HUMIDITY IS ALREADY SUFFOCATING, EVEN THOUGH THE SUN HAS BEEN UP FOR LESS THAN AN HOUR.

Cypresses rise from the ink-black water, branches unfurling some 40 feet above me, forming a towering cathedral of green feathers overhead. The massively swollen and buttressed bases could pass for those of old-growth mahogany in the neotropics, but the characteristic knees cresting the surface of the water anchor both tree and my imagination as I pull my kayak through this primeval forest still awash in a dance of light and shadow from the low hanging sun.

A splash of tarnished gold and brown in the form of a cottonmouth slips into the water from a cluster of cypress knees and glides a few feet past the bow of my boat, head held high in serpentine indifference. In quick succession, the dark and muted earth tones of the swamp are abruptly interrupted again by a burst of brilliant yellow and faded blue as a prothonotary warbler flutters about the long and flowing entanglements of Spanish moss in search of its morning ration of spiders.

TODD PUSSER

JARED LLOYD

THE STUNNING RED MOHAWK INSTANTLY BETRAYS THE WOODPECKER'S LOCATION IN THIS WORLD OF SHADOWS.

TODD PUSSER

TODD PUSSER

My trance-like state in this holdover from a prehistoric world is quickly broken by a raucous cackling sort of laughter. The sudden and sharp tones startle me and I bolt upright in my kayak as I quickly begin to scan the canopy with binoculars. This is my true purpose for being here, my reason for climbing out of a comfortable bed at 4 a.m. to come sneak my way into a hot and humid landscape full of alligators and spiders the size of dinner plates. I'm here to see how this one bird, a pileated woodpecker that plunges from the canopy to the trunk of a cypress tree not 30 feet from me, can transform a forest, whose influence essentially makes it an ecosystem engineer.

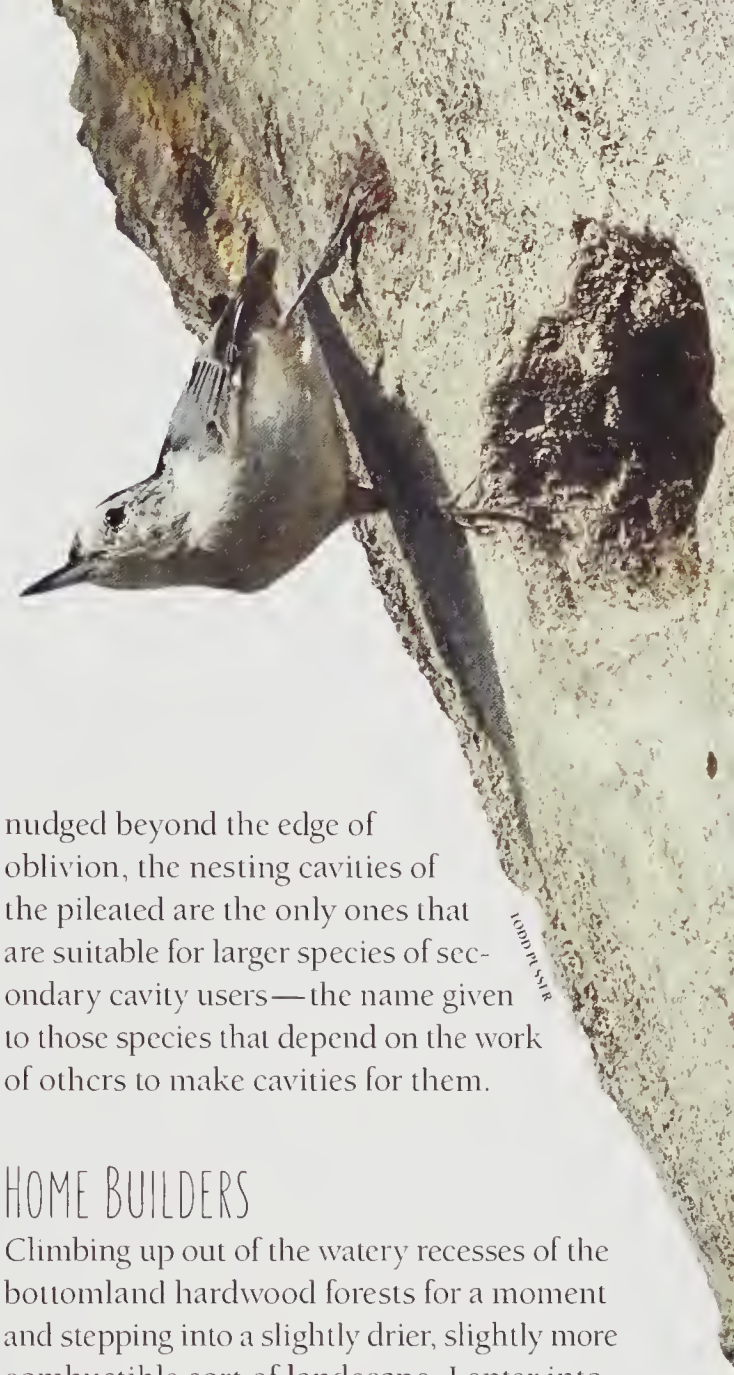
The stunning red mohawk instantly betrays the woodpecker's location in this world of shadows. Ever so faintly, I begin to hear a soft cooing sort of whisper coming from this king of woodpeckers — a sound quite in opposition to the machine gun-like hammering of this bird's territorial behavior that can often be heard echoing throughout our forests. Such gentle murmurs mean only one thing: I am within just a few feet of a nesting cavity.

I notice a dead and decaying black tupelo gum to my left. Woodpeckers of every variety prefer to excavate their cavities on a slightly down-facing side of a dead tree to help with keeping the rain out. With a couple of stealthy pulls of my paddle through the water, a hole materializes on the backside of this tree. As my luck would have it, the subtle whispers of the adult pileated have elicited the curiosity of a juvenile male who sneaks a peek out of the cavity while anxiously awaiting his father's gift of carpenter ants.

Several feet below, two other equally sized cavities sit abandoned on this timeworn and decaying tree. Such a sight is not uncommon, as pileated woodpeckers often see fit to excavate a new cavity every year or two. In prime territories, an observer is likely to discover many such cavities that have accumulated over the course of generations of tenants. Each breeding pair carve out a nesting cavity

A screech owl rests in a cavity made by a red-cockaded woodpecker. Other species that take advantage of woodpeckers' hard work include Carolina chickadees, kestrels and gray squirrels. Opposite page: A white-breasted nuthatch prepares to leave its cavity home.

NATURE'S WAYS Why Does It Take So Long For Red-cockaded Woodpeckers to Construct Their Nests? See Nature's Ways, page 43.



TODD PUSSER

for springtime nuptials, while roosting cavities to be used by the adults for the rest of the year are excavated once empty-nest syndrome settles in.

Nature abhors a vacuum. So when an ecosystem ends up with so many perfectly good but unoccupied cavities carved out in the neighborhood's dead trees, other residents begin to take notice. It is for this reason that woodpeckers, such as the pileated and its cousins like the red-cockaded and Northern flickers, are considered ecosystem engineers. Their presence in the forest quite literally changes everything, as they assume the role of architects that these forests and their denizens have come to depend on.

'Carpenteros' of the Forest

Woodpeckers are the only tribe of animals that wield the appropriate tools for carving out such functional cavities in trees. This fact has led our Spanish-speaking neighbors to the south to bestow upon these birds the name "carpentero." It's a designation that celebrates these avian carpenters as the artisan woodworkers that they are. An honorable name really, as opposed to "woodpecker," which the reverse of, "peckerwood," is a traditional insult in the Old North State.

The fact that these carpenteros are the only denizens of the forest capable of creating such cavities should give us reason to pause. Let us consider for a moment our peculiar obsessions with placing bird houses around our yards to attract a visual feast of bluebirds, chickadees, robins, Carolina wrens, purple martins and a litany of other birds to our homes. Not a single one of these species is capable of excavating their own cavities. Nor are any of the others that sometimes show up unexpectedly in bird houses and nesting boxes like wood ducks, squirrels (gray, fox, red and flying), and Eastern screech owls for that matter. Instead, each of these species is largely dependent upon the carpentry skills of someone else for their survival in this world.

Take a stroll through your favorite wood lot or hiking trail with the notion of spotting natural cavities in mind. It will quickly become apparent that such a thing is in short supply. By and large, the vast majority of suitable cavities in any given forest are created by the handiwork of woodpeckers with a statistical average of about 10 to 1. This means that 90 percent of the holes in trees that so many animals depend upon are exclusively provided by woodpeckers.

Across its range, the pileated woodpecker has an enormous impact upon the forests in which it lives. At least 38 species use the abandoned nesting cavities of this largest of North America's carpenteros. And it is for this reason that the pileated and other large woodpeckers are classified as a keystone species, a label given only to those who have a significant and far-reaching effect on the dynamics of ecosystems.

Size matters when it comes to woodpeckers' overall impact on a given ecosystem. The larger the bird, the larger the cavity will be and therefore the greater the diversity of would-be tenants. The size of the pileated woodpecker therefore has much to do with its contribution to the health and wealth of the world in which it lives—providing shelter and nesting opportunities for species as diverse as wood ducks and raccoons that the cavities of smaller woodpeckers would be unable to accommodate. Being our largest woodpecker now that the ivory-billed has been nudged beyond the edge of oblivion, the nesting cavities of the pileated are the only ones that are suitable for larger species of secondary cavity users—the name given to those species that depend on the work of others to make cavities for them.

Home Builders

Climbing up out of the watery recesses of the bottomland hardwood forests for a moment and stepping into a slightly drier, slightly more combustible sort of landscape, I enter into the longleaf pine savannas and the dominion of the red-cockaded woodpecker. When it comes down to sheer importance in a specific habitat, the red-cockaded woodpecker is the undisputed champion of the East. Roughly the size of a cardinal, this medium-size bird has a habit of doing something that no other bird is capable of on earth.

The longleaf pine savannas that once dominated the Southeastern landscape is a world regularly baptized in fire. Many ecologists argue that the dominant plant life, such as the longleaf pine itself and the ever-present wiregrass, actively work together to create and promote a fire regime so as to keep other competing species of vegetation at bay. The result is an ecosystem that is designed to experience low-intensity fires on a pretty regular basis.

With fire playing a pivotal role in sculpting and maintaining this ecosystem, there are very few dead trees just standing around, and even fewer possibilities of shelter on the ground. Enter the red-cockaded woodpecker and its unrivaled behavior of excavating cavities in living pine trees that provide a significant service in the ecosystem. There are 24 species of secondary cavity nesters that are fully

JARED LLOYD

dependent upon the presence of the red-cockaded, including other species of woodpeckers such as the red-headed in some cases, and even the pileated when present.

The Eastern bluebirds that fill the sky above these savannas in places like the Green Swamp Preserve and Croatan National Forest are all nesting in old red-cockaded cavities. The same goes for chickadees, titmice, flycatchers, American kestrels and a host of other species be they avian, mammalian or reptilian. Without the presence of the red-cockaded woodpecker in this ecosystem, the biological diversity nearly flatlines — excluding the kingdom of plants of course.

In other habitats across North Carolina, we find a variety of different species of woodpeckers at work in the trees together. Even in the maritime haunts along our barrier islands I have discovered downy, red-bellied, red-headed, yellow-shafted Northern flicker and pileated woodpeckers all within a single acre of forest. Yet in the longleaf pines and the landscape of fire, the red-cockaded woodpecker controls a monopoly on the architectural industry.

The Northern flicker is another one of these ecological architects that cannot be easily overlooked. But this bird differs greatly from both the pileated and the red-cockaded woodpecker in that there is nothing truly remarkable about it at first glance.

The Northern flicker is the most abundant woodpecker in North Carolina and builds more nesting cavities than its peers, like the red-headed woodpecker (opposite right) and red-cockaded woodpecker (opposite center). A Northern flicker chick (opposite left) peers out of its home.

TODD PUSSER

JARED LLOYD

TODD PUSSER

The flicker is not as large as the pileated, therefore not as many species are capable of using its cavities. Nor does it have the special skills needed to excavate cavities in ways or in habitats that others cannot, like the red-cockaded. The flicker is not even a particularly strong cavity excavator, preferring to feed on ants it finds on the ground than thrashing open trees like the pileated.

What the flicker happens to be, however, is the most abundant woodpecker in North Carolina, and therefore provides a home for more secondary cavity users than any other species. This, of course, is not to be confused with diversity. The pileated woodpecker provides cavities for the greatest diversity of species. The Northern flicker on the other hand, is all about sheer numbers.

The abundance of cavities carved out by the Northern flicker has helped shape the evolution of one of North Carolina's most beautiful winter residents—the bufflehead. This migratory game bird is one of the smallest species of ducks in North America. Nesting almost exclusively in the abandoned cavities of Northern flickers, some ornithologists believe that the size of the flicker has itself engineered the size of the bufflehead. Given that the flicker is far more common than any of the other large woodpeckers across its range, species such as the bufflehead have come to depend on this abundance for their own success.

Creating Diversity

Dependency in the natural world is the stuff that binds together the ecosystems that we ourselves depend upon for our very survival. It is these intricate relationships that create the perplexing duality of durability and fragility, characteristics that would seem poetically at odds with each other. With each element in place, these systems survive everything from hurricanes to ice ages. Remove one piece of the puzzle however, and the very fabric of an ecosystem can begin to unravel and collapse.

The keystone role in ecosystems, and the impact on other species that woodpeckers have, is truly remarkable. They play an extraordinary role for such a smallish and unsuspecting family of birds. Their presence in a forest—be it the pileated, red-cockaded, or any other species of woodpecker for that matter—has a ripple effect that can be found throughout every trophic level.

You see, diversity begets diversity. So by creating suitable habitats for other species as diverse as tree frogs, flying squirrels and screech owls, the carpenteros that eke out a living in the woodlands of North Carolina help to make our state one of the top 10 most biologically diverse in the country. It's an honor that should not be taken lightly.

Back to present reality: I'm still sitting motionless in my kayak watching until the male pileated finally decides that it is safe to approach his nesting cavity and chicks. Two heads lunge out of the cavity, mouths agape, squawks filling the air. Not wanting to be of any further disturbance to this family, I dip my paddle into the waters and pull beyond their little world as the haunting cries of a barred owl reverberates through this ancient swamp from somewhere off in the distance.

Gliding silently over the water, I pause momentarily to watch as a pair of wood ducks come racing down the little creek that I am following. They are heading toward the vicinity of the woodpeckers, a drake escorting a hen back to her nest in typical wood duck fashion. A smile opens up across my face, content with having had the chance to watch this system at work as it has here for countless millennia before the trespass of me and my kayak into this secret world.

> IT IS THESE INTRICATE RELATIONSHIPS THAT CREATE THE PERPLEXING DUALITY OF DURABILITY AND FRAGILITY, CHARACTERISTICS THAT WOULD SEEM POETICALLY AT ODDS WITH EACH OTHER.

Jared Lloyd, an occasional contributor to WINC, is a professional wildlife photographer and outdoor writer who grew up on the Outer Banks.

Even Closer to the Real Thing

NEW BREED OF TURKEY DECOYS OFFERS HUNTERS AN EDGE.

WRITTEN BY MARTY SHAFFNER

PHOTOGRAPHED BY RALPH HENSLEY

YEARS AGO I HAD AN OLD FOAM HEN DECOY — I CAN'T REMEMBER WHO MADE IT, BUT IT WAS NOT THE MOST REALISTIC RENDITION OF A HEN TURKEY. I RARELY USED IT BECAUSE OF THAT REASON, AND BECAUSE MY FAVORITE TURKEY HUNTING TACTIC AT THE TIME WAS TO "RUN AND GUN."

The decoy was aggravating to carry around when covering a lot of territory and I mostly left it behind in the truck. Now, with a smaller population of wild turkeys in my area and because I'm older (and a little thicker), I have slowed down my turkey hunting tactics. I try to scout in the preseason more often and have a gobbler or two partially patterned by opening day.

This past season I began to think that a couple of new, better-looking decoys could be helpful when setting up in some of the small food plots on the property where I hunt. So I took a little road trip and looked at all of the

A turkey hunter sets his decoys in the predawn light. More and more lifelike decoys are available to hunters, including ones with real or artificial fans on toms.

decoys on display at a retailer. Even though I had a couple of gift cards burning a hole in my pocket, I am a little thrifty and like to get the most bang for my buck. So I purchased a half strut jake decoy and a hen decoy for less than $75—a good investment for experienced hunters but not necessarily warranted for beginning turkey hunters.

I had devised a plan for opening day after pinpointing a couple of gobblers around one of the small clover patches on the property. That morning, under the cover of darkness in the clover, I slipped in my half strut jake just a couple of yards behind my alert hen decoy. I then settled in and waited on daylight.

As daylight broke on the cool and very windy morning, I was greeted to silence instead of gobbling. This very situation is why I bought the decoys, and after a few minutes I gave a hen yelp . . . and got no response. So I waited.

About 15 minutes later, I gave a more aggressive and louder hen yelp, but still got no response. Soon, though, things got interesting. I heard a turkey fly down off to my right and I held tight to feel things out. A few minutes later, I heard a gobble off in the hollow that was muffled by the wind. I yelped back three or four times, but the gobbler didn't answer.

Thinking I had nothing to lose and confident that no other hunters were nearby who might mistake my calls for the real thing, I gobbled back at him with my shaker call and immediately another tom fired back at me with a gobble that almost shook the ground. He was close but on the other side of the field from the first tom I had heard. I yelped back at him and followed it up with a gobble, but got no response from either, so I clammed up for a few minutes to see if he would come in silently.

In the meantime, the first tom gobbled again, and when I yelped back at him he cut me off with a gobble. He was slowly circling around and, from what I could tell, had made his way onto the logging road leading from the food plot up the ridge. I cut sharply at him and caught a glimpse of him strutting in the old road bed slowly making his way toward the field. He would take a few steps, then blow up in full strut for a few seconds, then break strut and slowly walk toward the field. I could catch glimpses of him through the trees lining the road.

When he got about 100 yards out, the tom spotted the decoys and stopped to eye them. I could see him studying them as he cocked his head from one side to the other. He was standing in the early morning light with his feathers shimmering iridescently as the sun reflected off of them. It was a beautiful sight.

A set of decoys often includes a tom or jake with a hen, a setup that is meant to induce a nearby tom into investigating the interloper.

It is also at this distance when most gobblers hang up as they approach a field and do not see the hen that had been making all that racket. But he saw her.

Only a jake stood in his way from making the hen his new girlfriend. He broke into full strut, then a running walk in full strut and ran right into shotgun range before he stopped to eye the situation again. He sensed something wasn't right but it was too late for him. I touched the trigger on the Beretta and the gobbler walloped the ground without making a twitch.

I made my way over to the tom, and upon inspection, saw he sported an inch and a quarter spurs and a nice long beard — a mature gobbler for sure. My new decoys had earned their keep on their first outing.

Variety at All Prices

A few years ago, the market exploded with new decoys, more realistic than ever, in every configuration imaginable, from hens in the breeding stance to toms in full strut. Hunting shows on TV that feature hunters in blinds with decoys set up prompted many turkey-call companies to offer turkey decoys. I'm amazed at how realistic some of the higher-end decoys look, but I am also surprised at the quality of some of the mid-priced ones.

Here are a few decoys that stand out as the most realistic along with others that do the job at a lower price.

At the top of the line in realism and price are Avian-X and David Smith Decoys. Both create decoys that look real and are favorites among hunters. Personally, I prefer the looks of the David Smith hen decoys but like the Avian-X strutting tom a little better.

These decoys are on the higher-end of the price range. The David Smith Decoys hen retails for around $119 and the strutting tom for $199. The Avian-X hens retail for $79.99 and the strutter for $119.99. Both also offer a quarter-strut jake, a decoy variation which I like, for $159.99 (David Smith) and $99 (Avian-X).

If these are a little too rich for your blood (they were for mine), there are a couple of other brands that impressed me for their price. H.S. Strut, a division of Hunters Specialties, has a new line called the "Snoods." They have a quarter-strut jake, an alert hen and a feeding hen that are pretty realistic and have an air bladder inside that inflates to prevent creases caused by folding the decoys. The hens retail for $59.99 and the jake for $79.99.

One of the cheaper offerings that I consider the best bang for the buck is the Primos Gobbstopper jake decoy. It is a quarter-strut jake decoy that retails for $39.99. I was so impressed with the price and how lifelike it looks that I bought one. They also offer a hen in the breeding stance but I preferred the jake.

If you are in the market for a decoy, be sure to look at them in person before you

make a purchase. Sometimes pictures just don't do them justice and doing side-by-side comparisons can be beneficial.

Decoys in the Field

A seasoned sportsman knows that no piece of equipment meant to attract fish or game works every time. Just as a specific fishing lure is not the hot bait every day, so it is with turkey decoys. But the newer, more realistic decoys seem to work better than their predecessors. Not every gobbler that sees your decoy is going to charge in to his demise, but they can be a valuable part of your turkey hunting arsenal.

Decoys are especially effective when hunting fields and food plots where turkeys can spot them from a long distance away, allowing turkeys to essentially put a face to the voice. They also work well when hunting in the afternoon to set up and call sparingly, hoping to catch a bird sneaking in silently.

This trio of decoys features a jake on the left, a strutting tom in the middle and a hen on the right. Inset: This shot of a real tom shows the snood across the beak and the major caruncles at the bottom of its neck.

Ask the Experts

Hunters Specialties Suzie Snood Hen Decoy

PHOTOGRAPHS ON THIS PAGE BY MELISSA MCGAW/NCWRC

The turkey hunting "purists" out there will sometimes argue the ethics of turkey decoys, but it's hard to argue their effectiveness. To put a finger on the pulse of the expanding market of decoy offerings, we made the quick trip down I-40 to Cabela's in Garner, and talked to Austin Arnold, sales lead for hunting, shooting and optics. In addition to dealing in turkey decoys, Arnold is an avid turkey hunter.

"The most popular line is the Avian-X," Arnold said. "As far as the turkey decoys go, David Smith makes very good decoys. The Hunters Specialties Snood line is good."

Arnold pointed out that some of the higher-end lines like the Avian-X have air bags inside to keep the form full and uncreased. The upper-level lines are not cheap. A jake and hen combination package from Avian-X will run $160; a flock of four costs about $475.

On the lower end of the price scale, Arnold said the Primos decoys are good sellers, and that the new Gobbstopper line from Primos is a good choice. They run about $50.

"I actually like this decoy," he said. "It's made really well and has a lot of detail. They don't have any play at all in them. If a tom does get ahold it will be real easy to repaint because of its hard surface."

Wildlife Resources Commission Hunting Heritage Biologist Walter "Deet" James is an avid turkey hunter who spends the month of March traveling the state while facilitating cooperative, conservation partner turkey hunting seminars. He uses decoys during roughly half of his outings but believes their purpose is more about creating a silhouette than actual realism. That is until the bird gets up close.

"By that time, he's dead if we do our part," James said.

James stresses that new hunters shouldn't feel as if they have to spend a lot of money on decoys to be successful. He uses foam decoys that he picked up at Walmart for less than $10.

"I use decoys 50 percent of the time," James said. "In most cases, and I'm a run and gunner, there's no time to set decoys up. Still hunts, or waiting and calling, is a better time to use decoys so as to take an incoming bird's eyes off of the caller. Moreover, in my experience, they work about 50 percent of the time. They can either bring the bird right in or scare him off if he becomes suspicious."

Like with most pursuits, James notes that nothing beats experience and skill. "Scouting, woodsmanship, patience, persistence, set up and being in the right place at the right time will bag more birds than gadgets ... That said, I've got a lot of gadgets."

In the field, Arnold said he usually includes a "breeder," or submissive hen in his setup, as the spring is mating time and decoys and calling take advantage of concurrent passion and jealousy.

"People have their own opinions of the toms and jakes, but either one is going to bring aggressive males," Arnold said. "A lot of people love the jakes because, no matter what, the tom is going to come in and want to fight the jakes. In my experience, a jake or a tom is going to work the same and that breeder decoy will work because of its stance."

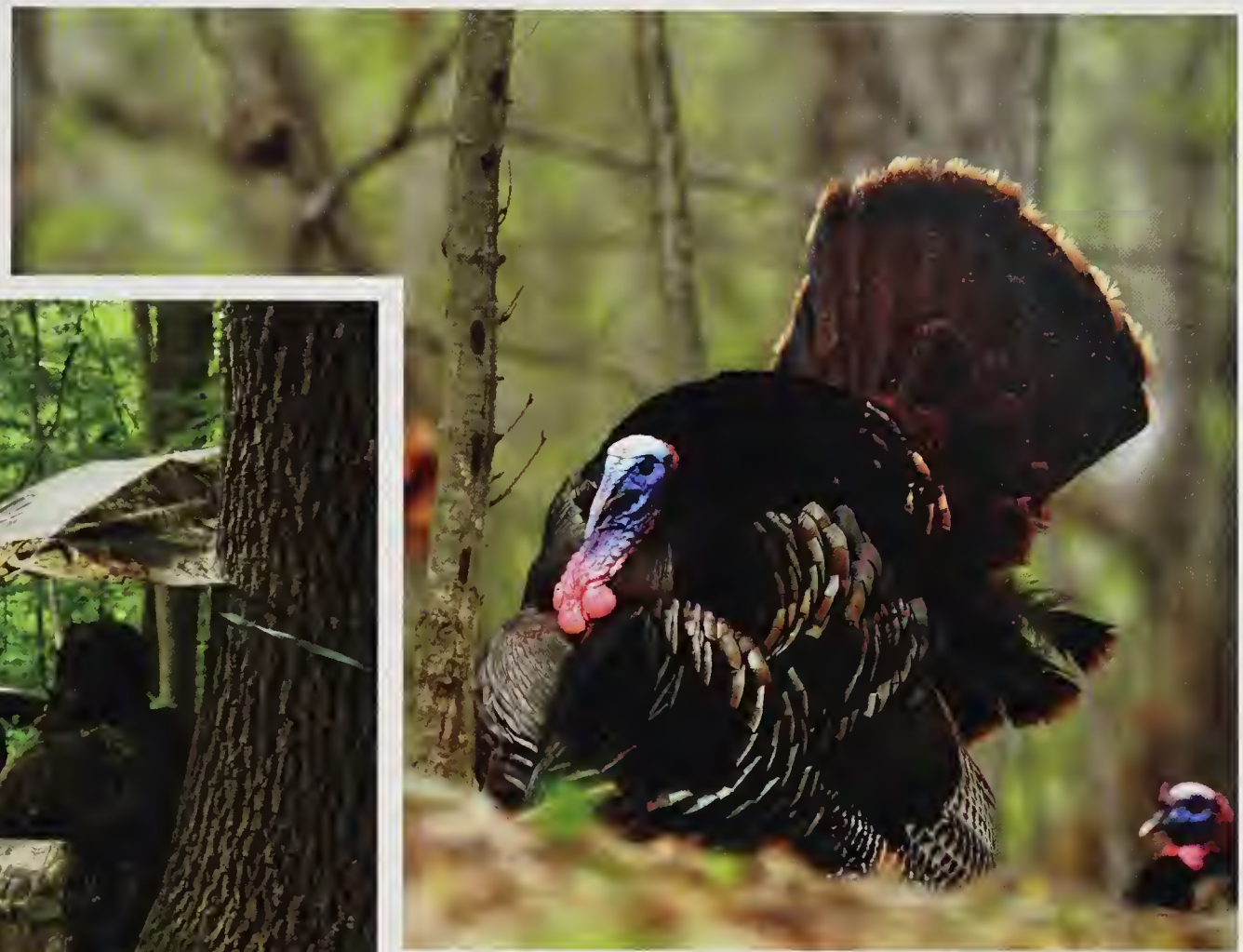
Arnold also mentioned the Flextone Funky Chicken (about $30) as a big seller. This oddly shaped decoy is mostly neck and head. "People say they look so small and wimpy turkeys just come right in to beat them up," he said.

A quick tip for those with the shell or hollow decoys: After pulling one out of storage, put it in a steamy bathroom for about 10 minutes to help reshape the body. Sometimes a blow dryer can do the same. Just be sure to clue your spouse in before taking a turkey decoy in the bathroom. It may look odd.

– Mike Zlotnicki

Avian-X Feeder Hen Decoy

Primos Gobbstopper Jake Decoy



A commercial blind set up near a decoy spread allows a hunter some manner of movement and concealment during the hunt. With any luck, a mature tom will strut into view and go home with the hunter.

Safety is paramount when using decoys. I witnessed a hunter shoot a decoy and thankfully no one was injured. Always assume someone is around even if they aren't supposed to be. Set up with this in mind and don't hesitate to shout at any hunter you see approaching your setup to alert him that your decoys are not the real thing.

The only downside to the newer, more natural looking decoys are that they aren't quite as lightweight and easily packed in as the older foam decoys, which can pose problems to the mobile hunter. This was the case when I blew my chance to harvest a second tom last season.

I knew there was another mature gobbler in the same area, but I couldn't track him down. I eventually realized that he was roosted next to the food plot where I had harvested my first bird of the season and that I had walked within 125 yards of him in the dark while hiking to the far ridge. By the time I made my way back over to the food plot, the tom had already pitched out and I could only crawl my way up to the edge of the clover patch for fear of spooking him.

I thought to myself, as I nestled against a tree along the edge of the field, this would have been a perfect setup for a decoy. But I figured the bird would come out into the field and strut anyway, giving me a shot. Well, as usual, what I didn't have was exactly what I needed. After calling to the tom a few times, I could tell he was working his way to the field and after just a minute or two I spotted movement on the far side of the field. I could see the gobbler, shrouded heavily by mountain laurel, standing there looking out over the field, looking for the phantom hen he had heard. After he scanned the field for a few seconds, he gobbled one time before easing back the way he came.

Oh, if I had only had my hen decoy set up in the field I most likely would have punched my second turkey tag. But because I thought I would be setting up in the heavily wooded ridge top, I elected not to take my decoys with me. Nothing works every time but my new decoys could have worked twice in their first season.

Decoys are just like your calls, not every call you have works every time out, but you carry them because they might work on any given day. Turkey decoys can be an important piece of gear to add to your hunting arsenal and, with some in-field experience and proper planning, they can definitely earn their keep.

Marty Shaffner is a frequent contributor to Wildlife in North Carolina *and a fishing guide in northwestern North Carolina.*

Follow The *Gold*

written by Curtis Smalling
photographed by Melissa McGaw

Researchers track golden-winged warblers from North Carolina to Central America to better understand this disappearing species.

IT was a chilly early spring morning on the Elk Knob Game Lands in western North Carolina when Chris Kelly of the North Carolina Wildlife Resources Commission and I struggled to get a good look at some banded male golden-winged warblers that we were following.

The temperature was about 38 degrees with a driving, heavy mist and it was hard to stay warm despite working hard on the steep terrain. We were here to spot map the warblers' territories before attempting to find their nests a week later. The mission is part of our ultimate goal to better understand these birds and develop ways to help them and other species that live in the shrubby, early successional habitats that have been on the decline in recent decades.

We hope to tie the area those males were defending and where their females put their nests to characteristics of the habitat by measuring values like the amount of grass, weeds, shrubs and trees, and what percentage of canopy coverage those represent. We also studied the types of plants in the area and some of the surrounding forest to really understand what the birds are looking for when setting up shop and starting their breeding cycle. This knowledge would allow us to design and produce best management guidance so that land managers and private landowners can create and maintain these specialized habitats for the bird.

Get To Know A Golden-winged Warbler

- These small songbirds, typically about 5 inches in length as adults, have short tails and a thin, sharply-pointed black bill.
- Males have a bright yellow crown and wing patch, black mask and throat, a gray back and white belly. Females feature a greenish yellow crown and wing patch that is duller than their male counterparts and have a gray back and white underparts.
- Male golden wings sing different songs associated with territorial defense, usually heard before dawn, that is a rapid stutter followed by lower buzzy notes. Males and females call to each other during courtship with "tzip" sounding notes.

Source: Cornell Lab of Ornithology allaboutbirds.com

So this cold spring morning is just a snapshot of the effort required to gain a better understanding of the golden-winged warbler. We have been studying the warbler for more than a decade, banded more than 280 of them, spot mapped territories at 11 sites in western North Carolina, found over 100 nests and sampled more than a thousand vegetation plots. "We" consists of not only Audubon North Carolina and the Wildlife Resources Commission, but a broad array of partners supporting this species.

The Golden-winged Warbler Working Group continues to study the life cycle of this species since being established by more than 75 partners in 2005. For over a decade, the group has been setting out to answer some very basic questions (and some pretty complicated ones as well) about how this bird lives and how we might be able to reverse one of the biggest and steadiest declines of any songbird in the Eastern United States. Most scientists agree that the bird's 97-percent loss in population since 1966 in the Appalachian region is largely due to the disappearance of its preferred shrubby habitats.

However, that change in the landscape tells only part of the story. Declines in suitable habitat for golden-winged warblers on private lands are also related to the conversion of agricultural lands to residential areas, changes in grazing practices to favor higher cattle densities (which in turn can reduce the amount of shrub and weed cover the birds need in favor of more grass), and loss of those grazing lands in some areas to Christmas tree production and other uses. At the same time over the past 40 years, the amount and extent of timber harvest on public lands like the National Forests of western North Carolina and elsewhere have decreased dramatically, resulting in local declines in birds using those public lands.

"Research by the (Golden-winged) Working Group has been the key to mapping out a strategic approach to conserving this species," said Kelly, a mountain wildlife biologist with the WRC who first began studying golden-winged warblers in 2001. "Efforts of the Working Group systematically identified vulnerabilities in the whole life cycle of the golden-winged warbler. We went from a pretty good understanding of the species a decade ago to now knowing a large percentage of what we need to know to effectively conserve golden-winged warblers.

"I wish we had this level of understanding for many other species of greatest conservation need, and in fact the efforts undertaken for the golden-winged warbler are serving as a model approach for conserving other species."

Where Do They Go?

Ten years ago, the Golden-winged Warbler Working Group wanted to know if all early successional habitat is created equal for this bird, and if it is possible to save this species and habitat while also protecting birds that live in forests. Management for golden-wings is also good for other high-priority early successional species, like ruffed grouse, American woodcock, chestnut-sided warblers and alder flycatchers.

One of the group's first activities in this project was to document where golden-wings occur in North Carolina. This included conducting surveys, looking for suitable habitat and testing if our methods of finding the birds were working. The Wildlife Resources Commission staff in western North Carolina has been a big help over the years in documenting and monitoring locations where we have golden-winged warblers and where we might have them in the future. We quickly learned that these birds are hard to detect, but adding playback of their song to our surveys helped us find a lot more birds. Unlike some persistent singers — like red-eyed vireo or American robin — golden-winged warblers do not sing a lot, and that little bit of singing is compressed into both the morning hours and early in the breeding season. In fact, once a male finds a mate, he sings even less. So now we know that a bird still singing consistently after June 1 is probably unmated.

We worked with Duke University graduate student Jamie Brown in 2007 to create a predictive model for where golden-wings are likely to occur, which showed that one of the best predictors is not how much early successional habitat is available but instead how much intact montane forest is available at a broad scale (like in a county, for example). We now know that golden-wings breed in landscapes that have at least 80 percent forested cover over an area of about 40 square miles. This becomes critical when thinking about conservation of the species so as not to create too much early successional at the expense of the forest at the landscape scale.

Retention of the forest at this broad scale can also influence how much competition golden-winged warblers face from blue-winged warblers, a close relative that can tolerate less forest at the landscape scale.

Researchers from the N.C. Audubon Society photograph a golden-winged warbler against the white background of a legal pad. Above: Wildlife Resources Commission biologist Chris Kelly scans trees for warblers. A decline in shrubby and grassland habitat has contributed to the decrease in golden-winged warbler populations.

This species has increased in recent years at the cost of golden-wings in areas where forest is on the decline. So, maintaining a higher percentage of forest cover to discourage blue-winged warbler colonization may be an important strategy to maintain the species.

Here in the southern Appalachians, we have another tool to discourage blue-winged warblers and encourage golden-wings: the elevation of the mountains. Golden-wings typically occur above 3,000 feet, whereas blue-winged warblers in North Carolina typically occur under 2,500 feet. That elevation preference helps keep the two populations somewhat segregated, ensuring that hybridization is kept to a minimum. We think this is why blue-wings have rapidly replaced golden-wings in some areas of their range (like lower elevations in Pennsylvania) where both can occur together and where forest fragmentation and loss is a big issue.

We have also learned that the amount of forest at the individual pair of bird's nesting location is also very important. We never could figure out early on at our study sites where the birds went during later parts of the day. We would follow them in the morning while they sang and foraged, and then about lunchtime they would disappear. They did not sing or interact with each other, so we were frustrated but curious. However, we now have a better idea of why that is, thanks to telemetry work done by partners in Minnesota, Tennessee and West Virginia.

As it turns out, males go into the adjacent mature forest to feed for most of the afternoon. We always think of them as an early successional bird, but the proximity of forest to their habitat is also important. And it becomes even more so after the young birds leave the nests (that the female most often builds out in the weeds in the early successional habitat). Thanks to tiny transmitters put on adults and fledglings, we now know that adult birds lead their young into the adjacent forest.

Golden-wings practice what is known as brood splitting. Once the young leave the nest (usually all on the same day), the pair split the brood into two groups, with one parent tending to one group and the other with the second group. They do not segregate by sex and it is not always an even split. The female does a better job of getting her

young into the forest and she often goes farther into the forest, often as much as 400 to 500 yards. The males tend to stay slightly closer to the open edge between forest and early successional.

This is the most critical time in the young birds' lives. Our pairs on our study sites are very successful in terms of fledging at least some young each year (often more than 95 percent of our nests are successful in that regard), but we now know that up to 80 percent of those recent fledglings are predated by snakes, other birds and mammals within the first seven to nine days. For those who make it past that first week, however, their chances of living until migration time are the same as their parents. Most predation also happens out in the early successional habitats, which may explain why birds take their young into the adjacent forest.

"This was a breakthrough," Kelly said. "I remember sitting at a meeting of the Southeast Golden-winged Warbler Partners Group in September 2013 listening to Dr. David Buehler of University of Tennessee Knoxville say something to the effect of 'We need to shift our focus to forested landscapes and the distribution of early successional habitat patches within them. Golden-winged warblers are a forest-dependent bird that goes into early successional habitat.'

"This did feel like a turning point in our understanding of the species."

So, given the importance of forest at these points in the breeding life cycle, we began to look at our assumptions about the habitat they use and prefer on their wintering grounds. We had helped with wintering range surveys a few years back and one of the things that stood out was that we found birds up to 30 meters into the mature forest, usually around wet areas or tree fall gaps where there was denser vegetation.

We also knew that they did use habitats that we thought looked like a breeding habitat—like shrubby fields and edges. But most of us assumed that they used mature forest more than they do on the breeding grounds. The telemetry work done on the breeding grounds made us realize that they probably use the different habitats in much the same way. So, forest remains an important component for their wintering grounds, and the transition to edge, also seemed important.

[illegible]

We partnered with John Gerwin at the North Carolina Museum of Natural Sciences and UNC Wilmington graduate student Sharna Tolfree to study the birds in their winter habitat in Nicaragua. The first work on this topic had been done by Richard Chandler in Costa Rica. We followed his lead for our study and put transmitters on several birds so Tolfree could track their movements.

What we found showed that golden-winged warblers defended forest adjacent to openings like shade coffee and shrubby fields, but tended not to defend the early successional from other golden-wings. Their territories often overlapped in the early successional, meaning they made use of those habitats, but really defended their forest from each other by chasing other male golden-wings out of their patch of forest.

We all want to know if those pairs will settle in a field in North Carolina to breed next summer. We are just beginning to understand where specific populations may be wintering. They do have what we call "site fidelity" with the same bird returning to the same area year after year. One female golden-winged at our study site in Nicaragua has returned for at least four years. But other methods exist and are starting to be used.

The first of those methods is what is known as stable isotope analysis. This method uses trace isotopes of certain elements that correspond to certain geologies and locations. The most common thing to use for this work is feathers. Most birds molt their feathers at least once a year and many do this both on the breeding and wintering grounds. A recent analysis of a sample of feathers collected from the wintering grounds suggests a basic slip southward for golden-wings, meaning that birds from the northern part of the breeding range winter the farthest north (Honduras, Nicaragua) and the birds farther south winter the farthest south, like northern South America. So our birds likely winter in Colombia, but more study is needed to confirm this.

And now, thanks to the miniaturization of technology, we have deployed geolocators on birds from across their breeding wintering ranges. In early spring 2015, Chris Kelly and I were back in the Amphibolite Mountains of Watauga County at Elk Knob State Park, capturing a male golden-winged warbler and attaching a small backpack known as a geolocator to him. These devices record the exact time of sunrise and sunset for that date, and from this data we can determine roughly where a bird is at any given time. Of course, recapturing the same bird the following year to retrieve the data is a challenge. But thanks to site fidelity, that is often successful. In fact, last year we deployed 27 geolocators at two sites and recovered 10 birds.

Back to Work

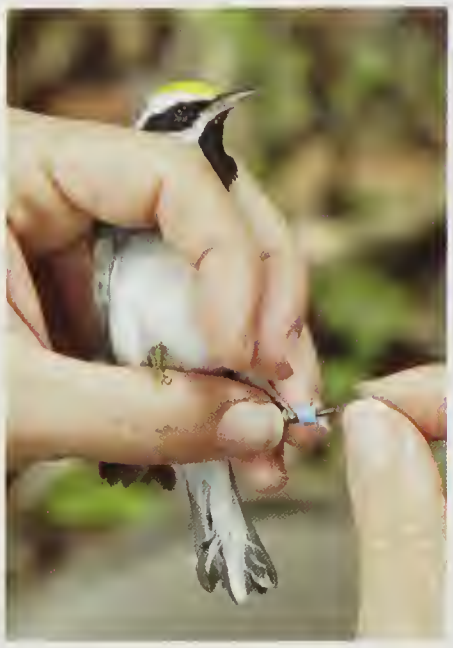
We will be eagerly hitting the field this spring to retrieve the geolocators we deployed last summer in North Carolina. This will give us a good idea of where our birds go for the winter season and which routes they take to get there.

So the next step, both here and on the wintering grounds, is to implement these findings for the conservation of the bird. We worked hard over the past year to complete and produce best management guides and a species conservation plan to help landowners and managers better manage for golden-wings. Thanks to the strong partnerships around this species, the Commission, Audubon, Forest Service, local and regional land trusts, and many other private and public land owners and managers are working together to halt this bird's decline.

The Golden-winged Working Group hopes to halt the decline in the population by the year 2020 and increase the population by 50 percent by 2050. It will take a lot of effort, and a lot of partners, to accomplish these goals. But now we have a good understanding of how we can do that throughout the bird's life cycle, and our science is giving us the answers to do this in an efficient, effective and sensitive manner.

Our early successional and our forest bird species need us to get this right, and we think we are on the right track. And this spring, biologists from Audubon NC and the Commission will be out there to see who has returned, and finally to know for sure where they went. ◆

Curtis Smalling is Audubon North Carolina's director of land bird conservation.



Opposite: N.C. Museum of Natural Sciences Research Coordinator John Gerwin, second from left, talks with fellow researchers at a shade coffee plantation in Nicaragua. Top: UNC Wilmington graduate student Sharna Tolfree does field work on golden-winged warblers in Nicaragua, including various measurements, banding and placing of geolocators.

WILDLIFE IN NORTH CAROLINA 2016 PHOTO COMPETITION

WILDLIFE IN NORTH CAROLINA MAGAZINE IS PROUD TO ANNOUNCE THE 12TH ANNUAL INSTALLMENT OF OUR POPULAR AND SUCCESSFUL PHOTO COMPETITION. Last year, almost 1,500 images were entered. This year, your winning photo could be published on the cover of this magazine. Adult photo competition entrants must be subscribers to *Wildlife in North Carolina* (call 1-800-786-2721 to subscribe or confirm your subscription to *Wildlife in North Carolina*). Photographers in the two youth categories (13–17 years old and 12 and under) may enter free of charge.

The cost of the prizes and the prints sent to winners has necessitated that the magazine join the ranks of many other photo contests and charge an entry fee.

The *Wildlife in North Carolina* Photo Competition aims to encourage people to participate in nature photography, thereby fostering greater understanding and appreciation of North Carolina's wildlife and wild places. Winning photographs will be published in the January/February 2017 issue of *Wildlife in North Carolina*. Thanks to our exhibition sponsor, JW Image Co. of Raleigh, the winners will also be exhibited at the Museum of Natural Sciences and at other science museums and wildlife education centers across the state in 2017.

The N.C. Museum of Natural Sciences, our founding partner, is a fantastic place to learn about North Carolina's wildlife and wild places through its exhibits and classes. North Carolina's outstanding state parks are ideal places to photograph wild animals and wild landscapes. Visit ncwildlife.org for more information about the competition. Then get outside and show us your best nature photography.

CATHERINE MCENTEE

This photograph of least terns protecting their nesting site from a ghost crab was one of nearly 1,500 images entered into the 2015 photo competition.

2016 COMPETITION RULES

WHO MAY ENTER

Amateur and professional photographers, except for employees of the N.C. Wildlife Resources Commission, the N.C. Museum of Natural Sciences, and their immediate families (children, siblings and spouses).

WHAT TO ENTER

Photos will be judged in 10 categories:

Birds

Mammals

Reptiles and Amphibians

Invertebrates

Wild Landscapes: The peaks, valleys, plains and beaches of North Carolina.

Wild Plants and Fungi: Wild-growing plants only, including their flowers, leaves, fruits and other parts. Absolutely no cultivated plants will be accepted.

Outdoor Recreation: Show how people interact with North Carolina's natural world through activities that are inextricably linked to nature, such as hunting, fishing, hiking, rock climbing or canoeing.

Animal Behavior: Anything animals do, from everyday activities to interactions with other animals to unusual behavior.

Youth Photographer, 13–17: Any of the above subjects, shot by photographers under 18.

Youth Photographer, 12 and under: Any of the above subjects, shot by children 12 and younger.

Photographs must have been taken in North Carolina no earlier than Sept. 15, 2012.

You must declare on your entry form if your photograph is of an animal in captivity, such as at a zoo, nature center or rehabilitation facility. Please do not enter photos of animals that are both captive and non-native to North Carolina (for example, polar bears or lions at the N.C. Zoo).

No pets or domestic animals will be accepted, with the exception of animals participating with people in outdoor recreation (for example, hunting dogs or riders on horseback).

Please do not harass wildlife in an attempt to photograph it.

Manipulation of images, either film or digital, should be limited to conventional darkroom techniques or basic sharpening and cropping. Images should contain only the subject matter as originally seen through the viewfinder. Multiple exposures, digitally stitched photos, high dynamic range images and photos containing any manipulated or added content will not be accepted and should not be entered.

Entries may not contain any text aside from that contained in the subject matter. Date stamps, signatures and trail camera information are not permitted, regardless of whether they are added during or after the image is photographed. Original images may be cropped to eliminate date stamps or other text.

An entrant must hold all rights to a photograph. Photos previously published or pending publication, or that violate or infringe upon another person's copyright, are not eligible. Please do not infringe on the rights of property owners in an attempt to photograph animals.

HOW TO ENTER

Visit ncwildlife.org, click on the Photo Competition link, and then click the Enter a Photo link to submit a photograph. **Only JPG files smaller than 2 MB will be accepted for upload.** Upload your photo using the online entry form on the website. Repeat this process for each photo entered. Entrants may submit a maximum of two (2) photos per category.

The competition begins at 8 a.m. on Wednesday, June 1, 2016. Entries must be uploaded by 5 p.m. on Thursday, Sept. 1, 2016. Entrants may verify receipt of entries by checking ncwildlife.org and clicking the Photo Competition link to view a text list of all entries.

An image may be entered in only one category. For instance, if a photo of a preening wood duck might fit in Birds or Animal Behavior, you must choose the one category in which you want the image to compete.

Entrants in the youth categories must be the appropriate age for the category entered on the closing date of the competition. Once a youth photographer has entered two photos in the proper youth category, they may enter other photos in any other categories they wish.

PRIZES

All winners will be published in the January/February 2017 issue of *Wildlife in North Carolina* magazine and exhibited at the N.C. Museum of Natural Sciences in Raleigh. Winners will also receive a print of their winning entry from JW Photo Labs.

Grand prize: Your photo published on the cover of the January/February 2017 issue of *Wildlife in North Carolina* magazine, plus $200.

First place, all categories: $100.

Second place, all categories: $75.

Third place, all categories: $50.

JUDGES

Winners will be selected by a panel comprised of staff of the N.C. Wildlife Resources Commission, the N.C. Museum of Natural Sciences and professional wildlife photographers.

THE FINE PRINT

By entering the *Wildlife in North Carolina* 2016 Photo Competition, entrants grant all sponsors the right to publish and use submitted photographs in print or electronic form to promote the competition. Reproduction of entries will include the necessary photographer credit.

Entrants agree that if their submission is selected as a winner, they grant all sponsors the right to display their photograph(s) at venues including but not limited to the N.C. Museum of Natural Sciences. Exhibition of entries will include photographer credit.

Entrants will be asked on the online entry form if their photo was taken in a North Carolina state park. All such entries will be provided to the N.C. Division of Parks and Recreation for possible usage in public information/promotional materials, park displays or agency press releases to various media outlets. Any such usage will include the necessary photographer credit.

Winners will be required to provide original source material — slides, high-resolution digital files or negatives — for reproduction in the magazine and for exhibition prints. Original digital files of winning photos must be accompanied by a color print of at least 4x6 inches.

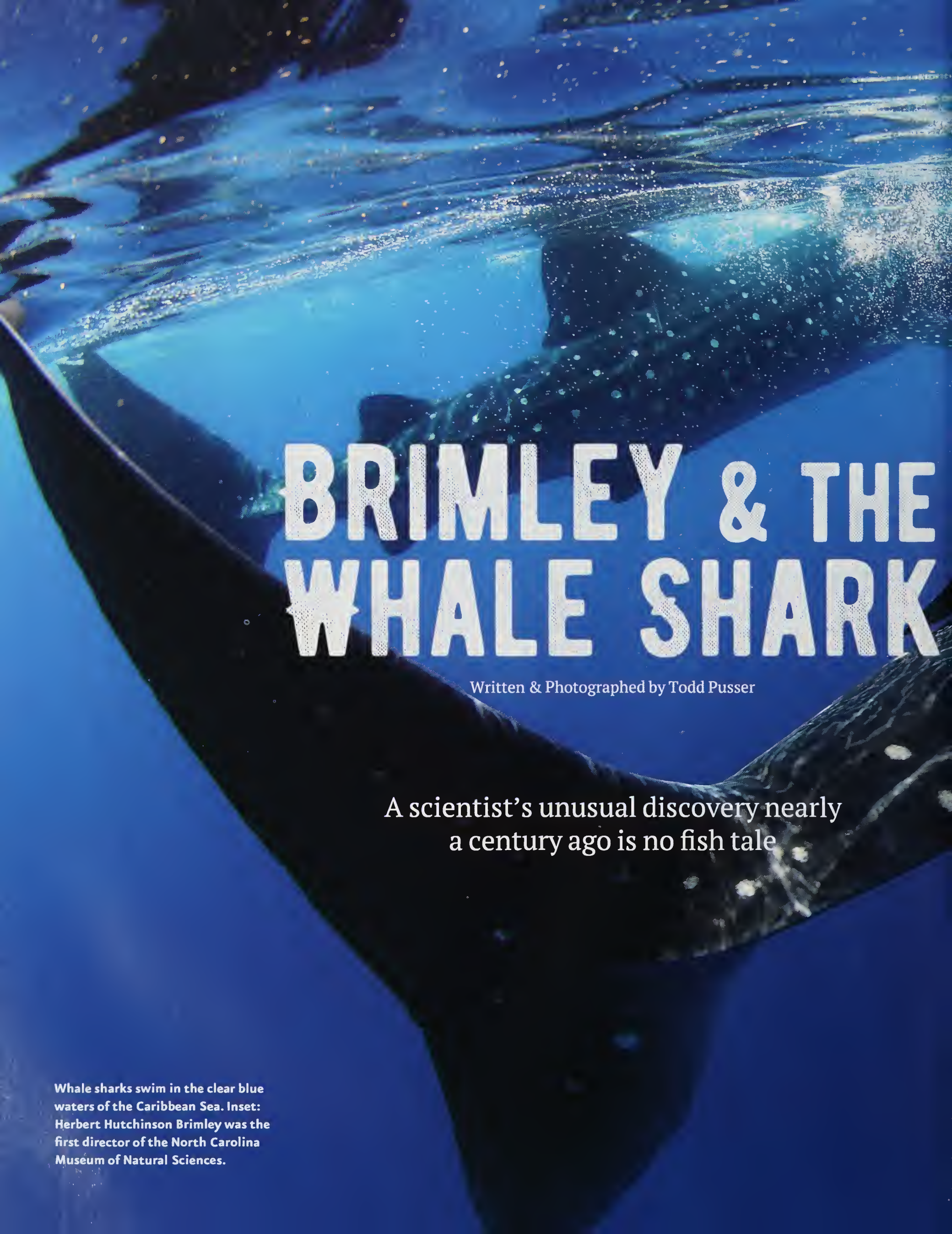
Wildlife in North Carolina staff will determine entry eligibility.

QUESTIONS?

Please do not call about entries. Send questions to competition@ncwildlife.org.

Enter online at ncwildlife.org.

Grab your camera and good luck!

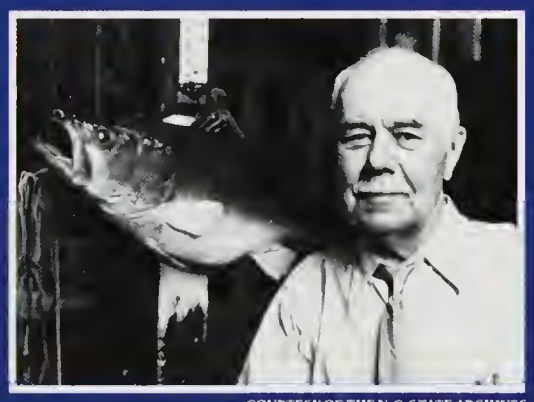


BRIMLEY & THE WHALE SHARK

Written & Photographed by Todd Pusser

A scientist's unusual discovery nearly a century ago is no fish tale

Whale sharks swim in the clear blue waters of the Caribbean Sea. Inset: Herbert Hutchinson Brimley was the first director of the North Carolina Museum of Natural Sciences.



COURTESY OF THE N.C. STATE ARCHIVES

THE SUMMER OF 1934 was among the hottest on record in the United States. Warmer-than-normal ocean temperatures in the Atlantic and Pacific oceans helped fuel the largest drought in this nation's history, turning hundreds of thousands of Midwest farmlands into one giant dust bowl, forcing hundreds of farmers into bankruptcy and pushing the country into greater depression.

Those same warm waters brought many strange and unusual creatures to many parts of the nation's shoreline. In early June of that year, the world's largest species of fish, the whale shark, was spotted for the first time in North Carolina waters. One man was there to record all the details.

Brimley collected some of the most spectacular marine specimens ever found in the state.

To say that Herbert Hutchinson Brimley was passionate about nature is an understatement. He was affiliated with the North Carolina Museum of Natural Sciences for over 60 years, including serving 43 years as its first director. Along with his brother, Clement, Brimley obsessively collected animals, minerals and plants from all around the state, and helped build one of the largest regional natural history collections in the United States.

In particular, Brimley had an innate fondness for ocean creatures. During his years as director, he oversaw the collection of some of the most spectacular and scientifically important marine species collected in North Carolina. Among them was the skeleton of a massive 55-foot bull sperm whale, one of the largest recorded anywhere in the world, that washed ashore dead along Wrightsville Beach in 1928. The bones of that giant still serve as a centerpiece of the Ocean Hall today, hanging high above the floor of the downtown museum. Another giant, the ocean sunfish (*Mola mola*), was secured from Bogue Inlet in 1926. Brimley, a gifted taxidermist, took measurements of the 8-foot long, 1,200-pound fish on the dock at Swansboro and, upon return to Raleigh, created a life-size papier-mâché model that was hung from the museum rafters, enthralling visitors for over 70 years.

Brimley used the same technique in creating life-sized replicas of a 13-foot long basking shark, *Cetorhinus maximus*, captured in 1935 in a shad net near Fort Fisher and a rare 17-foot True's beaked whale, *Mesoplodon mirus*, that was found dead on the beach at Oregon Inlet in March 1940. At the time, that specimen was just the eighth ever recorded.

One can only imagine Brimley's excitement when he received a wire telegram on the afternoon of June 6, 1934 from Louis Moore, the secretary of the Wilmington Chamber of Commerce, stating that a 50-foot-long whale was found grounded on a sandbar several miles up the Cape Fear River near Southport. The immense creature had been found by R.C. Fergus, a fish dealer from Wilmington, as he was working the waters of the river. Wanting to exhibit the animal at his establishment in Carolina Beach, Fergus tied a rope around its tail in an effort to pull the creature off the sandbar. Despite his best efforts, Fergus' small gas-powered boat just would not move the massive bulk stuck in the sand. Fearing people would doubt the veracity of his story, Fergus decided to cut the tail off the animal and brought it back to dock as proof of his find.

Within 24 hours of receiving the telegram, Brimley arrived in Wilmington to meet with Fergus and the two men journeyed down to Carolina Beach to see the remains of the animal collected the day before. Arriving at the site, they learned, much to their dismay, that health officials had confiscated the rotting remains and had deposited them at the town dump. Fearing a unique find for the museum might be lost for good, Brimley hurried to the landfill to try and locate the tail of the giant animal.

In a 1935 scientific paper in *The Journal of the Elisa Mitchell Society*, Brimley described the day's events. He and Fergus found the tail

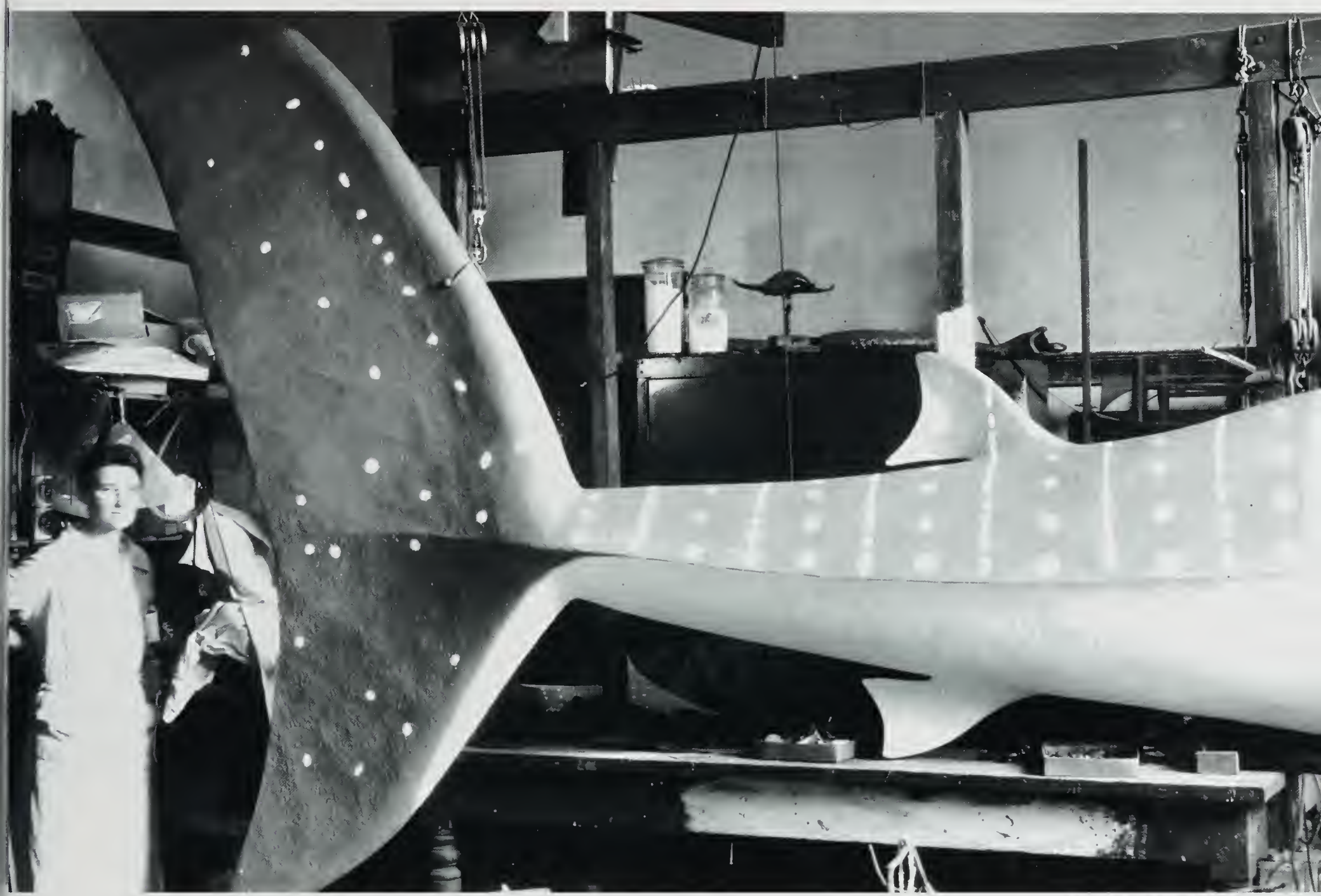
almost immediately upon arriving at the dump. Much to his surprise, the remains were not that of a large marine mammal as had been reported, but were in fact from a large shark.

"Definite identification was simple," Brimley wrote. "The sandpaper-like surface of the skin, the heterocercal tail, with its white spots, the side keels of the caudle peduncle, together with the enormous size of the tail, indicated that nothing but a large whale shark could carry such an organ."

Despite having dried and shriveled in the hot sun for over 20 hours, the tail still measured over 9 feet, 5 inches in length. Brimley estimated it came from a shark that was nearly 40 feet long.

CLOSE ENCOUNTERS

Though whale sharks are the largest living fish, scientists aren't sure just how large they really grow because accurate scientific measurements and weights from big specimens are surprisingly few. Most reported measurements of overall weight, like Brimley's shark, are



COURTESY OF THE N.C. STATE ARCHIVES

Herbert Hutchinson Brimley was a master of life-sized papier-mâché models and applied the technique to many marine specimens collected over the years off the North Carolina coast, including the tail of a whale shark found in the Cape Fear River.

simply estimates — few scales are suitable for weighing such large animals. Scientists suggest that whale sharks reach a maximum size of around 45 feet in length and a weight of 15 tons.

The immense size of a whale shark is how the species earned its common name; a name that can be quite confusing to the average person and is something akin to calling an animal a "horse-cow" or a "cat-dog." Is it a whale or a shark, or some strange hybrid between the two? The whale shark is not related at all to the warm-blooded mammals known as whales, but is a cartilaginous fish — one of over 500 species of sharks currently known to science.

Despite their impressive size and relationship to large predatory sharks like great whites, whale sharks have very small teeth and feed primarily on zooplankton, fish eggs and small fish. There are a few areas in remote corners of the globe where large concentrations of whale sharks gather at certain times of the year. I was fortunate enough to recently visit one such place off the coast of Isla Mujeres in Mexico, where the images for this article were taken. Every year from July through September, whale sharks gather by the hundreds in tropical blue waters just offshore this tiny island along the Yucatan Peninsula — a natural phenomenon only discovered by scientists during the last decade.

I have encountered whale sharks just a dozen or so times in over 20 years of working on the world's oceans. The encounters, often brief, were always from the vantage point of a ship, high above the ocean waves. Swimming with whale sharks underwater, up close and personal, has always been on my bucket list of things to do before I die. The waters off Isla Mujeres exceeded my expectations, and then some.

For four glorious days, my girlfriend and I spent hours and hours in deep pelagic blue water surrounded by nearly 300 whale sharks. The gentle giants swarm to these waters to feed on a vast amount of fish eggs released from the mass spawning of little tunny

Above Right: The world's largest fish dwarfs a nearby swimmer. Whale sharks gather by the hundreds in waters off Mexico each year to gulp down massive quantities of fish eggs.

Being in the water next to an animal the size of a school bus is a humbling experience, to say the least.

(*Euthynnus alletteratus*), more commonly known as false albacore, a small tuna found throughout the Atlantic Ocean.

Being in the water next to an animal the size of a school bus is a humbling experience, to say the least. The sharks off Isla Mujeres were so focused on feeding that they barely acknowledged our presence in the water. Whale sharks are one of the few sharks whose mouths are located at the front of the head rather than being underslung, like great whites and tiger sharks. With eyes set forward on their large heads and mouths wide open, gulping down gallons of fish eggs, whale sharks resemble gigantic bullfrog tadpoles. Unique among sharks, their bodies are covered in an intricate pattern of white spots. Each shark has its own distinctive spotting pattern and scientists, by photographing them, can track individual sharks over long periods of time.

Only within the last decade have scientists begun to unravel the natural history of the whale shark. Sophisticated satellite tags placed on the dorsal fins of whale sharks that gather off Isla Mujeres have shown that the animals are capable of long-distance movements in relatively short periods of time. After feeding on the fish eggs of the little tunny, some sharks traveled up into the Gulf of Mexico near the mouth of the Mississippi River off Louisiana. Others left Mexico to swim through the Florida Straits up the Atlantic seaboard following the path of the Gulf Stream. One even swam through the Caribbean Sea to the northeastern corner of South America, where it hung out for days near the equator off Brazil.

MYSTERIES REMAIN

Despite a recent increase of knowledge into the lives of whale sharks, basic biological questions about their natural history continue to elude scientists. For example, no one knows where whale sharks give birth. Very few neonate or juvenile whale sharks have been observed in the wild. Only one pregnant female whale shark, caught off Taiwan in 1995, has been examined by scientists. She was found to carry an astonishing 300 embryos in her uteri. Scientists do not know how many whale sharks are swimming the world's oceans or even how long the great fish live.

Though Herbert Brimley never got to see the rest of the body of the whale shark stranded in the Cape Fear River, he was able to determine the shark in question was an adult male, thanks to a clasper (the reproductive organ of which male sharks possess two) that Mr. Fergus had removed along with the tail. With copious notes and several black-and-white photographs, Brimley was able to make a life-size papier-mâché model of the whale shark's tail, which he displayed prominently at the museum.

According to Dr. E. W. Gudger, an ichthyologist at the American Museum of Natural History in New York, the Cape Fear whale shark was just the 78th specimen of a whale shark ever recorded anywhere in the world, and was the first of the species to been seen north of Florida. Since the 1930s, whale sharks have been found to be regular but rare visitors to our state's waters, often showing up in summer months on fishing grounds off the Outer Banks where warm Gulf Stream waters push close to shore. Lucky scuba divers have even encountered them while diving shipwrecks off Morehead City.

With more and more people taking to the sea for recreation and fishing with digital cameras in hand, whale sharks have been documented with ever-increasing frequency in waters north of our state. In August 2015, the *Virginian-Pilot* described a fisherman's encounter with a whale shark in waters near the continental shelf just north of our state line. Even farther north, spotter pilots flying offshore survey for the bluefin tuna fishing fleet regularly see whale sharks in deep-sea canyons off New York and Massachusetts.

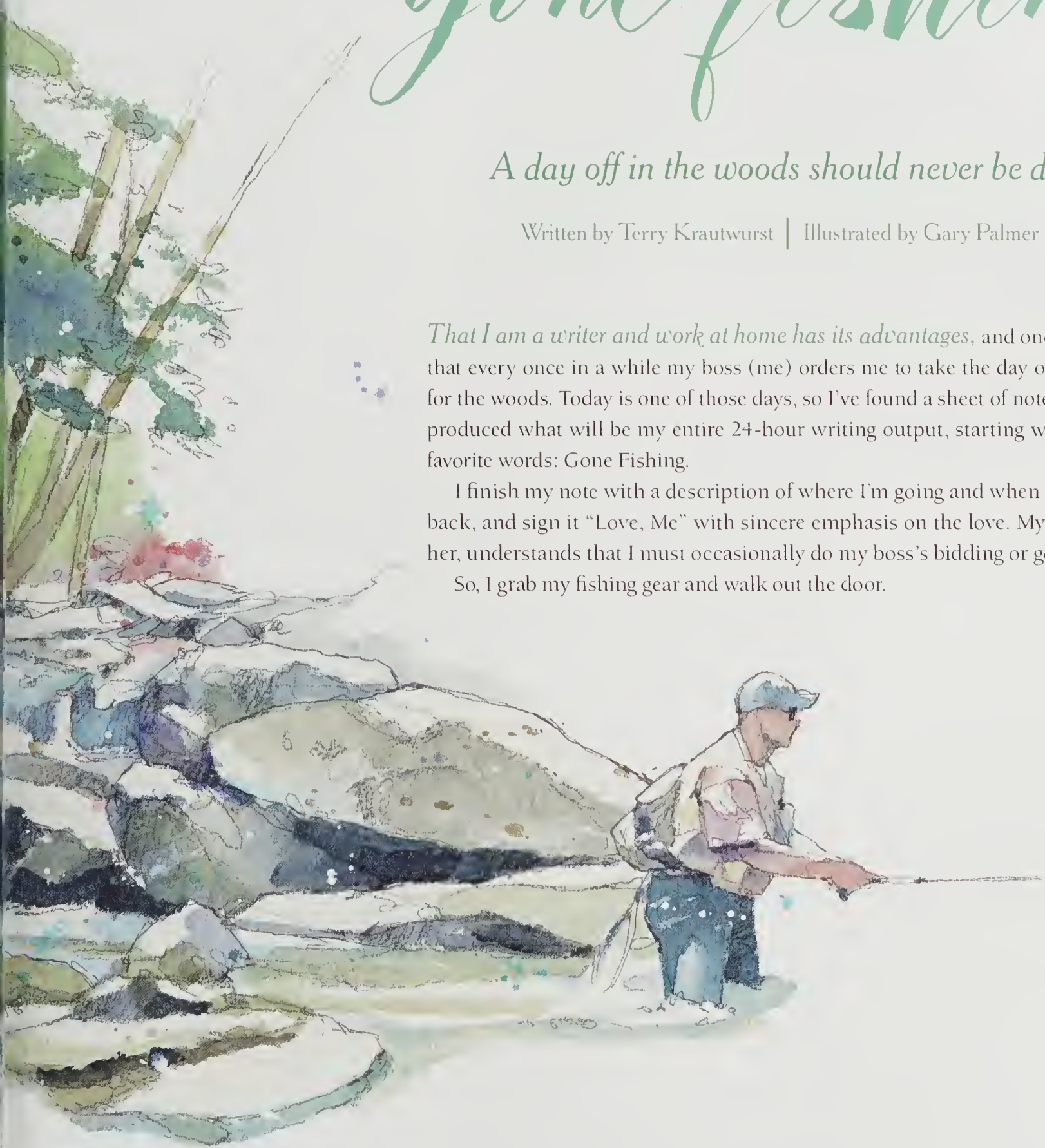
Herbert Brimley died in 1946 at the age of 85, just 12 years after discovering the whale shark in North Carolina waters. Many of the incredible specimens Brimley collected can still be observed in the North Carolina Museum of Natural Sciences in downtown Raleigh. Through their unquenchable enthusiasm for the natural world, dedication to conservation and popular and scientific writings, Herbert and his brother Clement inspired innumerable naturalists, biologists and outdoorsmen (including this author) to get outside and explore the incredible diversity of life found within the borders of our state and beyond. ◆

Todd Pusser is a marine biologist and a longtime contributor to Wildlife in North Carolina.

gone fishing

A day off in the woods should never be dull

Written by Terry Krautwurst | Illustrated by Gary Palmer



That I am a writer and work at home has its advantages, and one of them is that every once in a while my boss (me) orders me to take the day off and head for the woods. Today is one of those days, so I've found a sheet of note paper and produced what will be my entire 24-hour writing output, starting with my two favorite words: Gone Fishing.

I finish my note with a description of where I'm going and when I should be back, and sign it "Love, Me" with sincere emphasis on the love. My wife, bless her, understands that I must occasionally do my boss's bidding or go bananas.

So, I grab my fishing gear and walk out the door.

Fisherman's Luck. After 30 years of living in the mountains of western North Carolina I still can't believe my good luck. All around me, from the time I leave my house to as far as I can drive in an hour or more, are trails and trout waters. Yesterday's newspaper carried a photo of a man fly-fishing in the sparkling mountain waters I'm headed for now—according to the caption, he'd traveled from British Columbia for the privilege.

I turn off the highway onto a Forest Service road snaking into the North Mills River section of Pisgah National Forest, and minutes later pull into a trailhead parking lot. More good luck: It's early, and the lot is otherwise empty. Ah, solitude. Rod in hand, I set off hiking down a gravel access road toward the river rushing below.

A breeze stirs the forest, and suddenly I'm caught in a momentary downpour, the trees spilling dew from their branches, the drops pattering on the leaf litter around me—and on my now-dripping head. As I stop to pull a cap out of my day pack, I'm reminded of author Edward Abbey's description of the Appalachians: "the land of the breathing trees, the big woods, the rainy forests."

Indeed.

Both the Blue Ridge and the Smokies owe their names to the moisture-laden mist that swaths them, the product of upslope fogs and low-slung clouds. Droplets too minuscule to fall as rain gather on foliage until they coalesce and drop to the ground—if unimpeded by hikers' heads. Scientists call this "fog drip," a secondary form of precipitation that in our area influences plant communities and supplements already high precipitation rates. In some places, such as the Jocassee Gorges, annual precipitation nears or exceeds 100 inches, creating the only temperate rainforests in North America east of the Pacific Northwest.

A breeze stirs the forest, and suddenly I'm caught in a momentary downpour, the trees spilling dew from their branches, the drops pattering on the leaf litter around me—and on my now-dripping head.

Little wonder that western North Carolina forests nurture a wealth of moisture-loving organisms. Here, say scientists, live more species of salamanders than anywhere else in the world. Surveys show that salamanders are the most dominant vertebrate in North Carolina's old growth forests, their total biomass exceeding that of all birds and mammals combined. Here, too, is one of the world's greatest concentrations of fungi, mosses and liverworts.

Glancing down at a cluster of mushrooms huddled beneath a bracken fern, I cover my wet head with a dry cap and continue down the road to the river.

Making Waves. I swear, sometimes my little spinning rod acts more like a dowsing rod when it comes to trout water. Though I'm headed for the higher, smaller feeder creeks that eventually tumble into the North Mills, my rod keeps pulling me off trail to try some of the river's promising pools and riffles. I'm about to cast upstream when I notice a flotilla of water striders darting about in a still eddy behind a boulder at the water's edge. I squat down for a closer look.

Though they're appropriately called aquatic insects, water striders live not in water but on it, skating atop the surface film in staccato bursts. If you watch carefully, you can see each little foot pushing into the water's skin, dimpling but not breaking it.

Bending closer, I study one strider as it moves across the eddy, its middle pair of legs doing the rowing and the hind legs steering, its short forelegs at the ready for catching prey. Suddenly the skater I'm watching jumps, nearly clearing the surface, and changes direction. Nearby, I spy what at first appears to be an eight-legged strider; then I realize it's actually a mating pair, and I wonder if the lone wanderer has just been warned away. Water striders use their legs to communicate by sending wavelets of tell-tale frequencies rippling through the surface film. Males and females tap out come-on lines to potential mates and stay-away tattoos to competitors.

"Catch one?" comes a voice behind me, and I turn to see a fellow fisherman watching me crouched streamside. "No, just taking a break," I reply and, standing, tell him he's welcome to try this stretch, that I haven't yet cast into it and am moving on.

"Thanks," he replies, and flips a fly into the pool. As I head to the trail I glance back in time to see his rod suddenly bend, the line taut with a wriggling trout.

Choices. A half-hour later I can hear the sound of water spilling into the river over the old dam at the Hendersonville Reservoir. As I watch two anglers trying their luck in

the waters frothing at the dam's foot, I weigh my options. I'm tempted to take the trail west that follows Big Creek, a bold, rocky stream that descends steeply from the Blue Ridge Parkway through several miles of forested valley.

In 1895, Big Creek was the site of an infamous log drive, the brainchild of forester Gifford Pinchot, who'd been hired by George Vanderbilt to manage the Biltmore Estate's timberlands. Pinchot's plan was to float logs down Big Creek and North Mills River all the way to the French Broad. His men commenced building a 22-foot-high splash dam upstream on Big Creek, using stone-filled log cribs to hold back the impounded water. Meanwhile, crews harvested the watershed's vast stands of tulip poplars, chosen over oaks for their relative lightness and ability to float, and towed the logs to holding areas near the dam. Pinchot left before the dam was complete, and his replacement, German forester Carl Schenck, had reservations about the scheme. But Vanderbilt wanted the project completed.

When enough of the forest giants had been cut from the hills to send to the mill, the dam's gates were opened and a two-story wall of water sent the logs hurtling miles down Big Creek and North Mills, taking with them huge boulders, trees and shrubs, scouring the pristine riverbed, and flooding adjacent farmlands. Fields were underwater for days; logs were scattered everywhere. Once-plentiful fish disappeared. Schenck bemoaned the disaster.

"The pristine beauty of Big Creek had been destroyed," he wrote.

The loss of centuries-old forest and riparian habitat can never be undone, but time has helped heal some of the wounds. Today, timber again swathes the slopes, and Big Creek and North Mills keep outdoor lovers coming back for more.

Today, though, I need to stick to my original plan — in keeping with the note I left at home — and take the trail that heads northwest from the reservoir along Fletcher Creek and intersects with other small but fishable streams.

Land of Giants. I top a ridge and descend to a gurgling creek. The trail is narrow and wet and flanked by small hemlocks — most of which, I note with dismay, are flecked with cottony deposits. It's the work of a destructive newcomer to these forests, an aphid-like insect called the hemlock woolly adelgid. I stop at one of the trees and examine a branch, turning it over to reveal dozens of tiny white puffs at the bases of its needles. Within each is an adelgid feeding on stored sugars, sucking the plant's lifeblood. First reported in the state in 1995, the insect now infests every mountain county. Arborists can help homeowners protect landscape hemlocks, but control in forests is tougher. Although aerial spraying and biological agents show promise, the future of hemlocks in southern Appalachian forests remains uncertain.

Thinking this, I remember a huge old hemlock I came across years ago in a sheltered cove across the creek and over the hill from where I'm standing. So I stash my rod behind a boulder and cover it with brush, slosh through the creek, and scramble up the mountainside and down into the cove to search for the ancient tree.

Soon I'm standing at its massive furrowed base, peering upward into the tree's high, thick, needled limbs — even they soar above most other trees. Only rhododendron grows at the old man's shaded foot. Scattered about are the middens of its cones, nibbled bare like corn cobs by red squirrels. Certainly well over a century old, the tree wears its age well, though I note that some branches are bare at the tips — a possible sign of adelgid attack.

Still, the tree is a survivor. Old mountain hemlocks at this low elevation are rare. Most natives were toppled long ago for their bark, richer in tannin than oak or chestnut. In 1900, nearly three-fourths of all tannin used for the leather-tanning industry came from hemlock bark. The trees were felled, stripped of bark and left to waste like the corpses of skinned buffalo. Somehow this hemlock escaped; maybe it'll foil the adelgid, too.

Making a mental note to revisit the tree, I look around for landmarks to help me find

the spot later. In the distance a decayed tree stump catches my eye—and near it a jumble of rust-colored woody debris and black earth turned atop the leaf litter. When I investigate, I find the culprit's identity stamped clearly into a patch of exposed soil: a bear track. The arc of four—no, five—toe-pad prints ahead of a palm pad shaped like a sideways kidney tells me this is a forepaw. Rear paw prints are longer, resembling chunky human footprints. The faint, smaller fifth toe is on the left, so I know the print is a right paw's. A bear's smallest toe is innermost, the opposite of ours.

In front of each toe print is a small dot: nail marks from long, curved claws. I sit and look around at the chunks of stump and clods of earth the bear tore up searching for grubs and insects. This was a powerful animal. Black bears are the biggest beasts in these woods. I can still feel its presence. Like the old hemlock, the black bear too is a survivor, a progenitor of real wildness. It takes me a while, sitting there in the forest by the track, before I decide to move on.

I approach the swift current and am tying on a heavier single-hook spinner when I sense that I'm not alone. I glance up—and there on a limb across the water sits an Eastern screech owl, motionless, studying me solemnly.

Not Alone. Crossing the creek again, I retrieve my rod and continue up the trail, thinking of another native survivor I hope to encounter today: Southern brook trout. Old-timers call them speckled trout or "specks," claiming they're feistier and prettier than non-native Northern brookies. I'm inclined to agree, and find vindication in studies that suggest there really is a difference: Southern mountain brook trout carry a distinct genetic makeup that their Yankee counterparts lack.

Once plentiful, wild native brook trout need pure water and little competition, and have mostly retreated to high, isolated mountain headwaters. I know a stretch farther on where I might find some, but I'm in rainbow-trout territory now, and happy to cast a line for the wild descendants of that western species, introduced to area streams around the turn of the 20th century.

The creek turns sharply away from the trail and narrows into a fast, deep trough—a likely spot. I approach the swift current and am tying on a heavier single-hook spinner when I sense that I'm not alone. I glance up—and there on a limb across the water sits an Eastern screech owl, motionless, studying me solemnly. Of the two of us, apparently, I'm the most startled. A threatened screech owl raises its collapsible ear tufts and elongates its body to blend better into its surroundings, while closing its eyes to mere slits. This one seems relaxed, its body squat, its ear tufts barely visible, its big round yellow eyes wide open. Not wanting to frighten it, I divert my gaze slightly to avoid looking it directly in the eye—a gesture of aggression among animals—and slowly squat down to make myself smaller. The owl shifts its feet slightly and blinks once, then again becomes still.

I try to match its stillness, straining my peripheral vision to admire its rusty red plumage and white-streaked breast. Built like feathery fireplugs, screech owls are stocky birds barely 8 inches tall. Despite their diminutive size, they're ferocious hunters, using a hooked beak and sharp talons to dispatch mice, birds, worms and insects.

A splash at the channel's mouth breaks the silence, and a series of concentric rings radiate from the spot—dang, a trout feeding. Ironically, squatting here at a low angle for several minutes to watch the owl has kept me quiet and out of the fish's field of clear vision, giving me an opportunity I might not have otherwise had. But if I cast now, the rod's movement will surely spook the roosting owl into flight, forcing it to expend precious calories it needs to survive.

I take a last look at the little owl, rise slowly and walk back to the trail.

More Fish Tales. Later, I head west on an old railbed trail following a smaller creek—I've decided to check out the spot where I've seen brook trout. Eventually the creek winds out of sight, so I cut across through trees and scrubby vegetation. By the time I can see water again, I'm struggling hip deep in a mire of intertwined green, leathery-leaved arching branches, the tenacious foliage of a native Southern Appalachian evergreen shrub known as mountain dog hobble. Bear hunters, the story goes, gave the plant its name because a bear could crash through the stuff and escape from pursuing hunting dogs, which were slowed, or hobbled by it. Stumbling and cussing my way through the tangle, it occurs to me that "human hobble" would be a better moniker.

At last, I reach the stream. Just ahead I can see a nice fish holding in a small pool. Crouching, I take another step . . . and one last grasping snare of dog hobble trips me up.

My foot comes down hard on the streambank, and the trout zips from sight.

Erg. Chances are the fish didn't see or hear me—it felt me. Like most fish, trout are equipped not only with good senses of vision, smell and taste, but also with a unique vibration-sensing system called the lateral line, marked by the stripe that runs from head to tail along both sides. The line is actually a row of pores leading to a groove, just beneath the skin, filled with minuscule jelly-coated hairs. These sense organs can "feel" even slight waves or changes in pressure in or around water caused by the movement of, say, prey, neighboring fish—or a clumsy angler.

I try a couple of casts anyway. Sure enough, no takers. So I move upstream to another pool and cast again. Instantly a small brook trout darts to the lure and grabs it—to my regret. As it wriggles and pulls on my line, I can see that my catch is a mere fingerling, and I don't want to risk injuring it. I gently raise my rod and then lower it quickly to relax the line, and the fish flings itself free and disappears into the water. I enjoy catching wild trout, but I also want to release them as quickly as possible. So I've crimped the barbs on my lures' hooks flat. Often I don't have to handle a caught fish at all; if I let my line go slack the trout releases itself.

I can tell after a few more casts in a few more pools that the fish here are eager but tiny, even for wild brook trout—in the mountains, an 8-incher is a whopper. I decide to leave them alone, and hike back to Fletcher Creek's larger waters.

Time Flies. When I reach the creek and approach its rocky edge, my eyes focus on casting to a sparkling riffle a few yards ahead. Suddenly—yowww!—my left hand bursts into flame, or so it feels. I know even without looking at the tall, sawtooth-leaved weeds that I've brushed against wood nettle. The plant, common in moist woodlands and along mountain streams, is armed with tiny, needle-sharp hairs that penetrate skin and break off, injecting formic acid—the same burning chemical that puts the fire into fire-ant bites. Instinctively, I plunge my hand into the cold creek for relief—and gazing down, find insult to injury: My watch tells me it's time to head for home.

I hike to a wildlife clearing farther up the trail and sit atop a sunny hillside to change into dry socks and spread aloe vera ointment on my hand. Somewhere in the forest behind me, a squirrel scolds. Yellow swallowtail butterflies probe the starburst blossoms of tall Joe Pye weed swaying in the breeze. Across the grassy meadow, the woods thin and merge into wetlands. Just beyond is a beaver pond. Tall standing dead trees rise like spires from its water, their cavity-pocked trunks bleached gray.

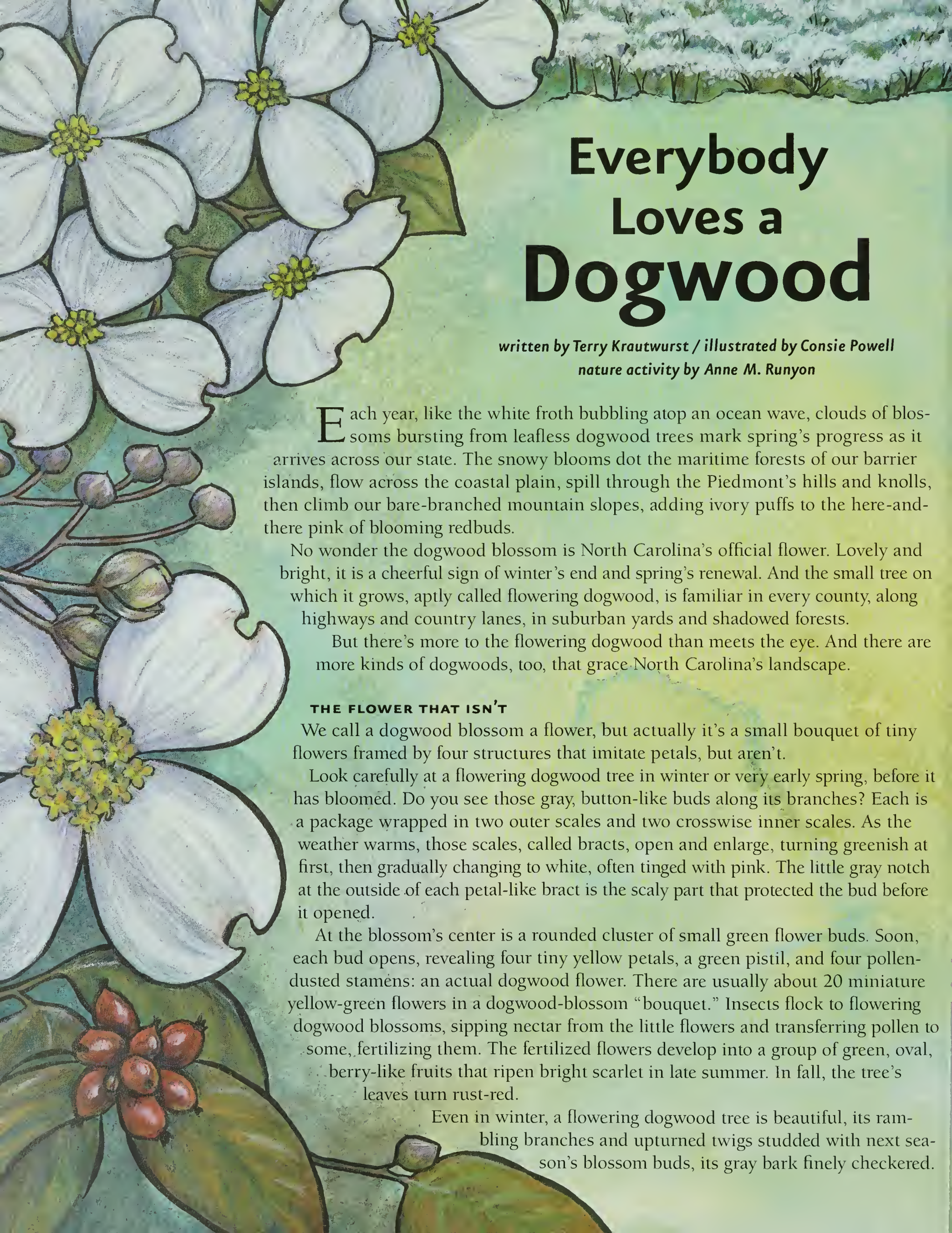
Reluctantly, I gather up my gear and commence the long hike back to the trailhead. When I arrive home my wife asks, "How was the fishing?"

"Great," I say, and tell her about my day: the owl, the bear track, the old hemlock, the water striders, the wood nettle, the beaver pond, the dog hobble, the streams and waterfalls—the sheer beauty of it all.

"Did you catch anything?" she asks, with a knowing look.

"Nah," I reply. "Maybe next time."

Terry Krautwurst is a freelance writer and frequent contributor to Wildlife in North Carolina.



Everybody Loves a Dogwood

written by Terry Krautwurst / illustrated by Consie Powell
nature activity by Anne M. Runyon

Each year, like the white froth bubbling atop an ocean wave, clouds of blossoms bursting from leafless dogwood trees mark spring's progress as it arrives across our state. The snowy blooms dot the maritime forests of our barrier islands, flow across the coastal plain, spill through the Piedmont's hills and knolls, then climb our bare-branched mountain slopes, adding ivory puffs to the here-and-there pink of blooming redbuds.

No wonder the dogwood blossom is North Carolina's official flower. Lovely and bright, it is a cheerful sign of winter's end and spring's renewal. And the small tree on which it grows, aptly called flowering dogwood, is familiar in every county, along highways and country lanes, in suburban yards and shadowed forests.

But there's more to the flowering dogwood than meets the eye. And there are more kinds of dogwoods, too, that grace North Carolina's landscape.

THE FLOWER THAT ISN'T

We call a dogwood blossom a flower, but actually it's a small bouquet of tiny flowers framed by four structures that imitate petals, but aren't.

Look carefully at a flowering dogwood tree in winter or very early spring, before it has bloomed. Do you see those gray, button-like buds along its branches? Each is a package wrapped in two outer scales and two crosswise inner scales. As the weather warms, those scales, called bracts, open and enlarge, turning greenish at first, then gradually changing to white, often tinged with pink. The little gray notch at the outside of each petal-like bract is the scaly part that protected the bud before it opened.

At the blossom's center is a rounded cluster of small green flower buds. Soon, each bud opens, revealing four tiny yellow petals, a green pistil, and four pollen-dusted stamens: an actual dogwood flower. There are usually about 20 miniature yellow-green flowers in a dogwood-blossom "bouquet." Insects flock to flowering dogwood blossoms, sipping nectar from the little flowers and transferring pollen to some, fertilizing them. The fertilized flowers develop into a group of green, oval, berry-like fruits that ripen bright scarlet in late summer. In fall, the tree's leaves turn rust-red.

Even in winter, a flowering dogwood tree is beautiful, its rambling branches and upturned twigs studded with next season's blossom buds, its gray bark finely checkered.

MOUNTAIN COUSIN

The alternate-leaved dogwood, named for its one-on-one-side, then one-on-the-opposite-side leaf and twig arrangement, can be as tall as the flowering dogwood, up to 30 feet. More often, it's a smaller tree or a large shrub. Its branches reach straight out from its trunk, growing gradually shorter toward the crown, forming a flat-topped shape resembling an Oriental pagoda.

The alternate-leaved dogwood grows only rarely in the Piedmont, but is common in the Mountains, where it hides amid understory plants in cove and hardwood forests. In sun-dappled spots in mid-spring to early summer, look for its wide flat sprays of small cream-colored flowers. From a distance, the clusters look fuzzy. Up close, each yellow-white spray, with its many tiny flowers holding pollen high on long, curving filaments, resembles a frozen fireworks burst.

In August and September, the pollinated flower clusters become groups of round, dark-blue fruit offered up on bright red stems.

WATER LOVER

Keep an eye out for this many-stemmed shrub, silky dogwood, while walking along streams or in other moist places in the mountains and Piedmont. The shrub's stems spring from the ground in a group, and the plant is seldom taller than 10 feet. To spot it among other plants in late spring and summer, watch for butterflies flitting about its white, umbrella-shaped flower clusters. By late summer, those clusters bear small round fruit that slowly ripen from white to pale blue or lavender. Run your fingers along the satiny hairs on its maroon twigs, and you'll know why this dogwood's name is silky.

SWAMP DOG

You need only read its name, Southern swamp dogwood, to know that this family member lives in the South, and in the wet. In North Carolina you'll find it in swamps and marshes and drainage ditches in the eastern half of the state, especially along the Coastal Plain. Also known as stiff dogwood, the shrub's many stems and rounded clusters of white flowers are similar to silky dogwood's. But Southern swamp dogwood grows larger, up to 15 feet, with stems as big as 4 inches across. Its twigs are pale red and its fruit bright blue. Not sure whether you're looking at a Southern swamp or silky dogwood? Break a twig. If the pith inside is brown, it's a silky; if it's white, it's probably this swamp dog.

ENVIRONMENT'S BEST FRIENDS

Biologists rate dogwoods among North America's top wildlife food plants. The fruits are eaten by at least three dozen kinds of birds (including grouse, turkey, cardinals and mockingbirds) as well as by squirrels, foxes, chipmunks, black bears and other mammals. In winter and spring, deer and rabbits browse on the plants' tender twigs and buds. Beavers snack on the inner bark.

Dogwoods help the environment in other ways. Flowering dogwood leaves are rich in calcium and decompose more rapidly than other leaves, improving the soil. The roots of dogwood shrubs in wetlands and along streams hold soil in place, preventing erosion. The shrubs' leafy, intertwined branches provide support and shelter for birds' nests.

Of course, humans benefit from dogwoods, too. In the past, dogwoods' hard, dense wood made it popular for mallet heads, golf clubs, chisel handles and sled runners. Nearly all shuttles for weaving textiles were made of dogwood. Today, flowering dogwood and its lesser-known cousins beautify our yards and countryside while helping to sustain the wildlife we love.

Some wild flowering Dogwood trees produce entirely pink bracts, and many nursery-grown dogwoods have been bred to produce pink blossoms.

Most flowers that rely on insects for pollination have large or colorful petals to attract bugs to their inner parts. But a tiny dogwood flower's petals are barely noticeable. The flowering dogwood blossom's showy bracts make up for that, inviting pollinators to visit not just a single flower, but the entire cluster of little flowers at their center.

Get Outside

Follow the dogwoods into spring. When you see dogwoods in bloom, you know it's time to explore the new season's many wonders. Look for wildflowers such as trillium, bloodroot and Dutchman's breeches. Listen for the trill of robins and the chiming of spring peepers. Because most trees are still leafless, squirrels, owls and other creatures are easier to see. In marshes, puddles and ponds, look for blobs of frogs' eggs and wriggling tadpoles. Smell the fresh scent of bursting buds, baby leaves and new green growth. Ah, spring!

Plant a dogwood tree. Few trees are prettier, or more beneficial to wildlife. Sadly, in recent years a fungus called dogwood anthracnose has been killing many wild dogwoods. But nurseries offer disease-resistant varieties that have a better chance of surviving. Spring and fall are the best times to plant dogwood trees.

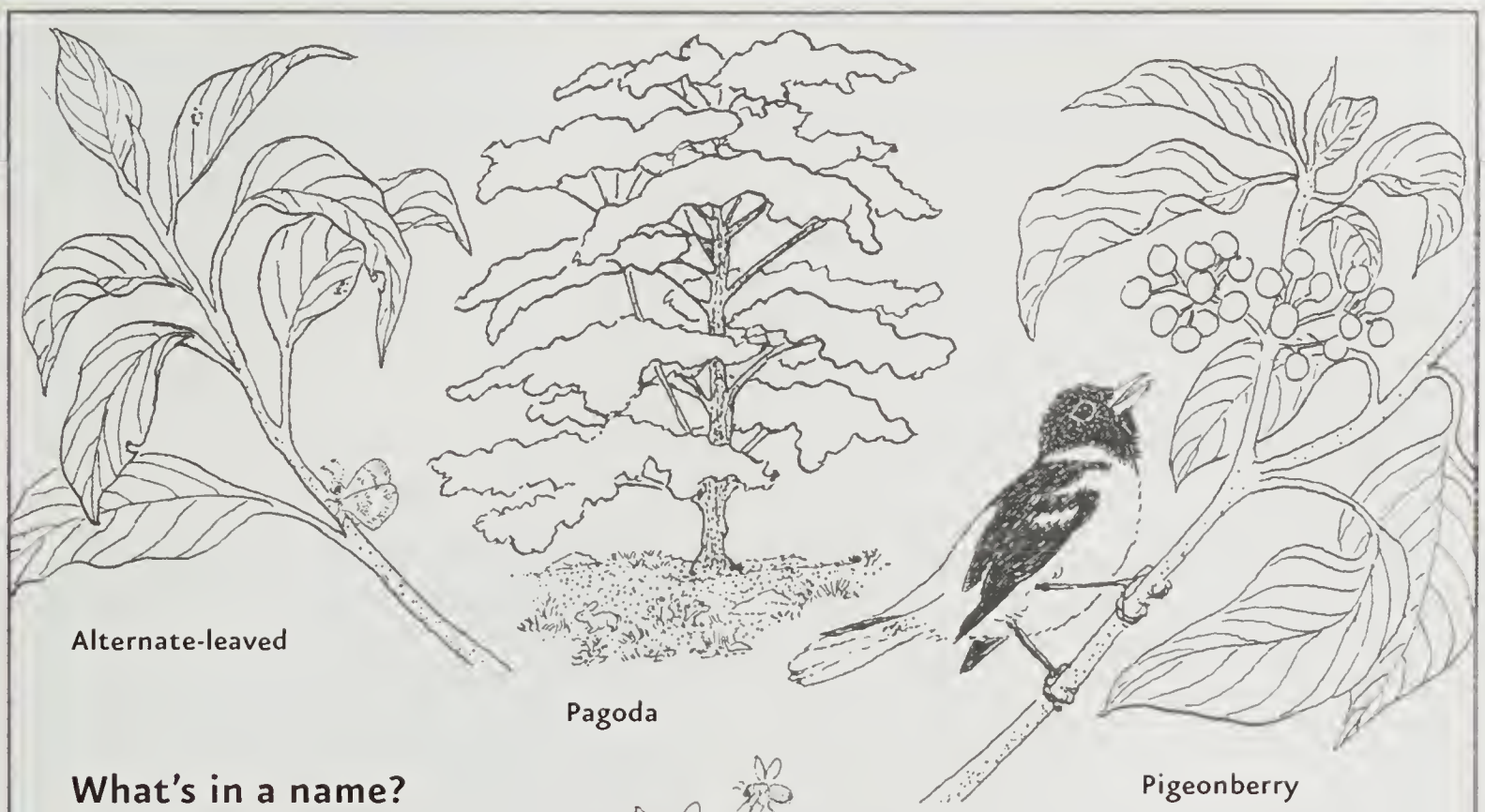
Read and Find Out

- "State Flowers," by Elaine Landau, Franklin Watts Publishers, 1992.
- "Native Trees of the Southeast: An Identification Guide," by L. Katherine Kirkman, Claud L. Brown and Donald J. Leopold, Timber Press, 2007.
- "Forest Plants of the Southeast and Their Wildlife Uses," by James H. Miller and Karl V. Miller, University of Georgia Press, 2005.
- "Wild North Carolina: Discovering the Wonders of Our State's Natural Communities" by David Blevins and Michael P. Schafale, The University of North Carolina Press, 2011.

Find out more about Project WILD Workshops and literature at the Wildlife Commission's website at ncwildlife.org.

Alternate-leaved Coloring Card

1) Copy design onto sturdy paper.
2) Cut out design and color. These dogwoods have creamy flowers, blue berries on red stems, green leaves and brown bark.



What's in a name?

Many plants have more than one common name. For instance, the alternate-leaved dogwood has at least three other names. Some call it a pagoda dogwood because its shape resembles an oriental dogwood. The alternate-leaved dogwood is also known as an umbrella dogwood because its leaves form a dome while clustering at the ends of its branches. And since birds love this tree's berries, some call it a pigeonberry.

Cornus alternifolia is a Latin name meaning "dogwood with alternate leaves." Botanists try to avoid confusion among common names by giving each plant a specific name based on its physical and genetic structure, and its relationship to other plants.

Rare Breeds

Other dogwoods living in North Carolina include two that are particularly rare. The Eastern roughleaf dogwood is a small tree similar to the Southern swamp dogwood but shorter with narrower leaves and white fruit. It grows only in ancient overgrown shell heaps and limestone-bed forests found in coastal southeastern North Carolina. Equally rare is the gray dogwood, a wetlands-loving dogwood shrub common in the Northeast and Canada but found here only in Orange County. It, too, produces white fruit.

Commission Biologists in the Spotlight

Several North Carolina Wildlife Resources Commission biologists recently were honored for their involvement in various land management projects.

The Commission's Wildlife Habitat Program received the Unit of Government Award from the Hugh Hammond Bennett Chapter of the Soil and Water Conservation Society. It was recognized for its efforts outside the realm of traditional wildlife management to promote best management practices that benefit not only wildlife but also soil and water conservation on lands owned by North Carolina's private landowners.

This group consists of Wildlife Research Program Supervisor Mark Jones and Technical Assistance Biologists Patrick Farrell, Benjy Strope, John Henry Harrelson and John Isenhour.

The Wildlife Habitat Program offers free voluntary management plans and advice to interested landowners and impacts tens of thousands of acres statewide each year. Planning may cover forestry practices, cropland management and the management of pastures and hayed lands for livestock. Efforts are focused on habitats benefiting everything from golden-winged warblers and ruffed grouse in the mountains to bobwhite quail, wild turkeys and regionally important songbirds in the Piedmont and Coastal Plain.

Gordon Warburton, mountain region ecoregion supervisor, was named 2015 Biologist of the Year by the North Carolina Bowhunters Association. In a press release, the NCBA stated that it "wants to especially recognize (Warburton's) commitment to the sportsman and wildlife on the Nantahala and Pisgah National Forest Game Lands during the ongoing forest revision plan."

Warburton focused on keeping sportsmen updated on the management plan process by providing information at meetings. He and his staff have also taken an innovative approach to planning, the NCBA notes in its release, including adding wildlife focal areas and a songbird diversity matrix that provides direction for creating new habitats in the forest.

"Warburton has provided leadership within his agency and to the Forest Service to make improving conditions for wildlife a priority," the NCBA wrote. "He has promoted the working forest and multiple use concepts, and sound forest management as a means to provide critical wildlife habitats for a large group of species that are in trouble."

Meanwhile, Friends of the Mountains-to-Sea Trail recognized Commission biologist Chris Baranski for his efforts to build, maintain, and promote the section of the 1,150-mile state trail that runs through game land along the south shore of Falls Lake.

Baranski, a northern Piedmont game lands management biologist in the Division of Land & Water Access, was recognized at the Friends of the Mountains-to-Sea Trail's annual meeting on Feb. 6. The timing of the award coincided with the Commission's decision to allow construction of a second campground along the trail for hikers and hunters. These two campgrounds, which are built and maintained by the Friends organization on game lands, have made it possible for more people to use this part of the trail for multi-day backpacking trips in the heart of the Triangle region.

RYAN KENNEMUR/NCWRC

MELISSA MCGAW/NCWRC

TOM GRIFFIN

Above L–R: Patrick Farrell, Benjy Strope, Mark Jones, John Henry Harrelson, John Isenhour. Left: Gordon Warburton; Chris Baranski receives an award for his work on the Mountains-to-Sea Trail.

"We appreciate all that Chris and his team do to support the trail," said Jeff Brewer, volunteer trail crew leader for the Falls Lake section of the MST. "The campsites are NCWRC's latest contribution to help people experience the beauty and wildlife of this special part of North Carolina, but they are only the latest. NCWRC staff are always fast, responsive and clear in all of our dealings with them. They are a pleasure to work with."

e NEWSLETTER
Get N.C. Wildlife Update news including season dates, bag limits legislative updates and more – delivered to your Inbox from the N.C. Wildlife Resources Commission. Sign up at ncwildlife.org/enews.

Waterfowl Stamp Art Awarded

A lifelike painting of an Atlantic brant by Florida artist Garrett Jacobs has been selected as the 2016 North Carolina Waterfowl Conservation Stamp and Print.

The acrylic painting was unveiled on Feb. 4 at the 21st Annual East Carolina Wildlife Arts Festival and N.C. Decoy Carving Championships in Washington.

Jacobs was one of 31 wildlife artists from 18 states to submit an entry and his artwork will be used on the 2016 N.C. Waterfowl Stamp and Print. Signed and numbered regular edition prints with mint stamps will be available July 1 from the Commission's N.C. Wild Store for $145.

The competition began in 2008 as a partnership between the Commission and the East Carolina Wildfowl Guild and is now managed by the Washington Tourism Development Authority.

Although Jacobs, who lives in Orlando, has been painting wildlife since the 1980s, this is the first time he has won a duck stamp competition.

Each year, the Commission specifies five eligible species and related habitats for the competition. This year, artists were invited to submit paintings of tundra swans, blue-winged teal, Atlantic brant, gadwalls and bufflehead.

Proceeds from sales of the print and stamp support the Wildlife Resources Commission's Waterfowl Fund, which generates revenue for the conservation of waterfowl habitat in North Carolina.

IN SEASON

In May and June, these seasons are open in North Carolina:

Wild Turkey (male or bearded only): through May 7

Delayed Harvest Trout Waters: At 6 a.m. June 4, these waters open to youths under 16 years of age under Hatchery Supported Trout Water regulations and to all other anglers at noon.

There is no closed season or bag limit for feral swine, groundhog, striped skunk, nutria and armadillo. There is an open season for taking beaver with firearms or bow during any open season for the taking of wild animals.

Check the latest *North Carolina Inland Fishing, Hunting and Trapping Regulations Digest* for bag limits and applicable maps or visit ncwildlife.org.

From Greenhouse to Rifle Range

Students with rifles on a high school campus? It's a positive movement at Smithfield-Selma Senior High School, where an old greenhouse was converted in January into an air rifle range for the Navy Junior Reserve Officers' Training Corps (NJROTC).

"The old dilapidated greenhouse on the southeast side of our campus was no longer contributing to education. ROTC identified a need and expressed desire to use this old building, so we decided to give a great old structure a fresh makeover," said SSS Principal Stephen Baker.

By the start of the 2015–16 school year, the transition of the greenhouse into a 1,200 square foot, six-lane indoor air rifle shooting range had begun. For the next five months, SSS Carpentry Teacher Charlie Bailey, ROTC Naval Science Instructor CDR Mike Wegman, and Senior Chief Ernest Frazier worked with students, contractor and school officials to transform a failing structure into a solid, modern, compliant facility. Students and volunteers did about 70 percent of the work.

Funding for the project included $5,000 from the Wildlife Resources Commission, $3,000 from the National Shooting Sports Foundation and $2,500 from Smithfield American Legion 132. Bass Pro Shops of Cary kicked in over $500 in shooting supplies. Students can go on range only after taking two weeks of classroom instruction on firearms and passing a written test with a score of 100.

MIKE ZLOTNICKI/NCWRC

Members of the SSS NJROTC squad are flanked by instructors Commander Mike Wegman, left, and Senior Chief Ernest Frazier.

"What we're doing here is developing good citizens," Wegman said of his NJROTC classes, which serve about 70 students each semester. "(We're) teaching them to be patriotic, that it's important to vote, that it's important to pay your taxes and to understand our nation's history."

To support the program, tax deductible donations can be made online at www.gofundme.com/NJROTC-SSS.

CALENDAR OF EVENTS

Saturday, May 21

Enjoy old boats? Come to the 11th Annual Antique and Classic Boat show. Hosted by Raleigh, Durham, Chapel Hill Triangle Chapter of the NC Antique and Classic Boat Society. The event is located at the Galley Stores Marina in New Bern at 300 E. Front Street from 9 a.m. to 3 p.m. Admission is free to spectators. Visit www.vintageboat.org or contact Alan Hills at rdcacbs@yahoo.com or 252-514-8525.

Friday–Saturday, June 10–18

The 58th Annual Big Rock Blue Marlin Tournament returns to Big Rock Landing in Morehead City. The main Big Rock fishing will start on Monday and run through Saturday. Spectators are encouraged to show up at the Landing each afternoon to see what marlin or "meat fish" (tuna, wahoo or dolphinfish) are brought to the scales. The tournament has raised almost $4 million for local charities since 1986. For more information go to thebigrock.com.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation- oriented and should be submitted at least four months in advance to mike.zlotnicki@ncwildlife.org, or call 919-707-0175.

LIFETIME LICENSES

Help conserve wildlife for future generations. In 1981, hunters, anglers and wildlife enthusiasts became shareholders in an innovative investment and conservation program called the North Carolina Wildlife Endowment Fund.

Today, the commission has 19 different lifetime licenses in five categories: Infant, Youth, Adult, Senior and Disabled.

The endowment fund for wildlife was a simple yet revolutionary idea: Create a lifetime inland fishing or hunting license. Put the license fees into a special fund. Spend the accrued interest, not the principal, on programs and projects that benefit fish and wildlife. To learn more or to purchase a lifetime license visit ncwildlife.org/licensing or call 1-888-248-6834.

Changes in Wildlife Regulations

The N.C. Wildlife Resources Commission voted on proposed rule changes to the state's game land, wildlife management and inland fishing regulations during its commission meeting on Feb. 12.

Of the 37 proposed rule changes, 34 were approved as taken to public hearings. The effective date for the approved regulations, which are for the 2016–17 seasons, is Aug. 1, 2016. For a complete list of rule changes, visit ncwildlife.org and download the public hearings booklet.

Wildlife commissioners approved eight wildlife management proposals, including one that would establish the framework to open an elk hunting season in western North Carolina. Along with this proposal, they adopted a complementary resolution delaying the issuance of any elk hunting permits until state, federal and tribal land organizations have determined appropriate allocation of permits based on annual sustainable harvest goals and population viability.

"Our next step will be to work closely with our partners, including the Eastern Band of Cherokee Indians, to establish clear metrics to guide a permit-only hunt sometime in the future," said Commission Executive Director Gordon Myers. "Together we will work to determine sustainable harvest goals and how to allocate harvest across the population range."

As defined, the elk hunting season will be from Oct. 1 through Nov. 1 with a bag limit of one per permit. The manner of take would be any legal firearm or archery equipment.

Commissioners disapproved a proposed alligator hunting season out of an abundance of caution and desire for additional biological information. Because the take of alligators in some situations is reasonable and appropriate, the commissioners directed Myers, through a resolution, to examine options that would utilize the skills and expertise of North Carolina sportsmen and women to provide assistance in removal of alligators under nuisance or depredation circumstances.

Myers will create an Alligator Task Force to develop a North Carolina Alligator Management Plan, which would include an evaluation of biological information and knowledge gaps on alligators in the state and recommendation for a framework for gathering public input on the plan.

Each year, wildlife commissioners vote on proposed regulations changes after hearing staff recommendations and reviewing comments received by the public.

Shooting Events Coming to Butner

The Civilian Marksmanship Program and Creedmoor Sports, Inc., are cosponsoring two events at Camp Butner this month. The 2016 Eastern CMP Games will run April 29 – May 3 with Small Arms Firing School and the M16 Match. The event will also have four Garand /Springfield / Vintage Military matches and the Modern Military match.

The Creedmoor Cup runs May 4–8. The Creedmoor Cup Matches begin on Wednesday May 4, with an Advanced Highpower Clinic and a NRA 50 shot 4-man team match.

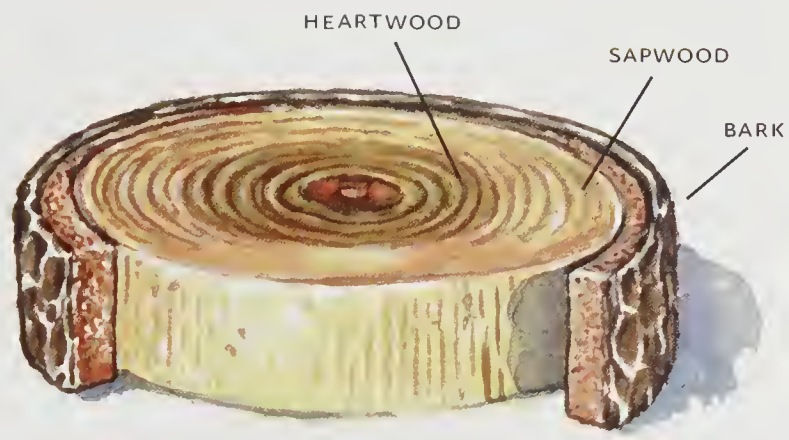
The Creedmoor Cup 240 shot (2400 point) aggregate match will be fired over three days. The Creedmoor matches conclude on May 8 with an EIC Match. The event features special hospitality events and prize awards.

The Civilian Marksmanship Program (CMP) is a national organization dedicated to training and educating U.S. citizens in responsible uses of firearms and air guns through gun safety training, marksmanship training and competitions. The CMP is a federally chartered 501(c)(3) corporation that places its highest priority on serving youth through gun safety and marksmanship activities that encourage personal growth and build life skills. For more information including contacts and registration, go to thecmp.org/competitions/cmp-travel-games/eastern-games/.

Why Does It Take So Long For Red-cockaded Woodpeckers To Construct Their Nests?

written by Clyde Sorenson
illustrated by Jim Brown

THE ENDANGERED RED-COCKADED WOODPECKER is one of North Carolina's natural treasures, since it is emblematic of the longleaf pine ecosystem of the Sandhills and Coastal Plain regions. Red-cockaded woodpeckers are unique among woodpeckers because they nest exclusively in cavities excavated in living trees. The fact that they prefer longleaf pines over others explains why it takes them up to six years to complete a cavity, although most take much less.



LONG-LEAF PINE CROSS SECTION

Even though the longleaf pine is classified as a "softwood," its wood is actually very hard, very dense, and very strong. The wood found in a longleaf trunk consists of the lighter-colored, living sapwood surrounding the darker, resin-filled and dead heartwood. In some older pines, red heart fungus (*Phellinus pini*) invades the heartwood, making it somewhat softer, but the woodpecker still has to penetrate the tough sapwood to reach it. Many cavities are excavated into trees without such rot.

An individual woodpecker may make several "starts" before excavating in earnest. The bird pecks an entrance about 2 inches in diameter, which leads to a tunnel, which often slants upward somewhat, about 4 inches long. The actual nesting and roosting cavity is usually about 9 or 10 inches deep and about 4 inches in diameter.

The woodpecker's labors doesn't stop with the construction of the cavity. As it works on the hole, it removes the bark around it, creating a smooth "plate" around the entrance. It also pecks resin wells all around the plate and up and down the trunk, instigating copious resin flows that protect the cavity from snakes and other predators. Active cavity trees look like pale green candlesticks, thanks to this resin, and stick out among the brown trunks of the forest.

Junior's Record Largemouth

written by Jim Dean

Many fishermen have dreamed of catching the world record largemouth bass, but who in the world would ever dream that a sixth grade dropout, dirt-track race driver and part-time carpenter from Georgia would claim he'd landed such a whopper, and get national attention for telling an even bigger "whopper" about how he caught it? And how much more improbable is it that this wild fabrication would launch a 14-year career as a TV star on "Hee Haw?"

ILLUSTRATION BY JACK PITTMAN

Meet Alvin Samples, Jr., better known as "Junior."

I recently ran across some TV infomercials selling DVD sets of those original "Hee Haw" shows. Beginning in 1969, "Hee Haw" ran in various syndications until 1993, and in reruns beyond that. Lame as it was, my whole family loved it, especially my dad, and I'll admit it was a treat to again see the Kornfield Kounty stars mixing truly classic country music with the nutty skits and corny jokes that were the hallmarks of what must be one of the most beloved (and despised) shows ever on the tube.

Here was Roy Clark, Buck Owens, Archie Campbell, Gordie Tapp, Grandpa Jones and the rest of the gang, including those lovely ladies—Lisa Todd, Gunilla Hutton (Nurse Goodbody) and many others—who were such essential members of the cast. And here again was Junior Samples in all his fractured-English glory, wearing hog-washers and selling used cars while Misty Rowe in short-shorts held up a hand-lettered sign with the phone number to call. Doesn't everyone remember BR-549?

"Junior had little education, but he had a rare gift for storytelling. He also loved practical jokes."

I also realized that I know some things about Junior that aren't common knowledge (his online biographers don't provide many details, and they get some of it wrong). So, in the interests of historical accuracy, angling memorabilia and whimsy, here's a little more of the story.

In 1932, George Perry caught a 22-pound, 4-ounce largemouth bass in Montgomery Lake in Georgia. That fish was weighed at a market and seen by others, but it raised some eyebrows since Perry's family ate it and no photos exist. However, Perry's fish was declared the world record, one that still stands, although a bass caught recently in Japan has apparently tied it.

Junior had little education, but he had a rare gift for storytelling. He also loved practical jokes. He was cleaning a sizable grouper that he'd caught while fishing with his buddies offshore on a head boat when he had an idea. Realizing that the head of a grouper resembles that of a largemouth, he cut off the head and paraded it around town, saying that it was from a 22-pound, 9-ounce largemouth that would break Perry's world record. Word began to get around.

Biographers claim that Georgia Wildlife Resources biologists recorded the interview with Junior that made him famous, but the credit actually belongs to Jim Morrison, a reporter for *The State* newspaper in Columbia, S.C. Morrison tracked down Junior and recorded his tale, and though he soon realized it wasn't true, he thought Junior's account was so funny that he went back and recorded several other hilarious tales.

The exact sequence is unclear, but Zero Hour Bomb Company (Zebco) got involved because Junior claimed he'd caught his bass on a Zebco reel. At some point, perhaps with Zebco's encouragement, Chart Records in Nashville, Tenn., made a 45-rpm record of Morrison's original tape featuring the "World's Biggest Whopper" on one side and "It Happened to Junior" with some of his other tales on the other.

As a promotional stunt, Zebco sent those records to the news media and members of the Outdoor Writers Association of America. As outdoor editor for a small newspaper, I made the list. I still have that 45.

Somebody on the production staff of "Hee Haw" must have also gotten hold of that record because Junior was invited to join the cast in 1969, where he remained a popular fixture until his death in 1983.

That's not quite all, however. In 1980, I went to Nashville for a conference of editors, writers and educational employees for state and federal wildlife agencies who, among other things, publish magazines like *Wildlife in North Carolina*. We all stayed at The Maxwell House in downtown Nashville where, it turned out, some of the "Hee Haw" cast were also housed.

One afternoon in the lobby, I spotted Junior Samples. He was standing patiently in line to get an autograph from Dennis Weaver (star of "McCloud" on TV). That curious incident was easily eclipsed by what happened next.

Late one evening, one of my editor friends went to the hotel's large public hot tub where he sat relaxing neck deep in hot water. No one else was there, but after awhile, a striking young lady in a yellow bikini joined him. It was Misty Rowe.

"She was very nice and we talked for awhile. It was," he remembered fondly, "a religious experience."

If all this seems hard to believe, call BR-549. Misty might be able to help.

NEIL JURNIGAN

Juvenile rough green snake

OUTDOOR MOMENT

IN THE JULY · AUGUST ISSUE

WAYNE DAVIS/OCEANAERIALS.COM

BIG BLUE

Bluefin tuna is not only one of the most extraordinary species of fish in the ocean, but it is also one of the most mysterious and, sadly, endangered.

MEANING OF THE HUNT

A Wildlife Resources Commission staff member takes a personal journey to examine why he and so many others are driven to hunt.

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